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TIGER (*PANTHERA TIGRIS*) ON THE PROWL

Photo : Girish Kumar



NOTICE

We have been requesting our members and subscribers to pay their subscriptions in time. We may once more remind them that yearly subscription becomes due on 1st April of current financial year and must be paid before 30th of September. Thus the subscription for 1998-99 has become due on 1-4-1998, which very few members have paid so far, despite the lapse of 5 months. The members are requested to pay their subscription for 1998-99 before 30-9-98, so that their membership may be renewed. The revised subscription for annual members, is Rs. 150/- per annum from 1998-99.

Many annual members have not paid their subscription for 1996-97 and 1997-98. We have been making repeated requests to members in the last 4 issues of 'Cheetal' to clear their dues. We cannot send notices to individual members due to enhanced cost of postage. Therefore, the collective notice printed in 'Cheetal' may be treated as final notice. Membership of those members who fail to clear their dues for 1996-97 and 1997-98 will get terminated automatically.

Members and subscribers are also requested that in addition to annual subscriptions, they should make voluntary donations to help the Society tide over its difficult financial position.

Honorary Secretary

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OURSELVES

WITH this issue, 'Cheetal' has completed 40 years of its publication. The first issue was published in October, 1958. The last four issues of 'Cheetal' were largely devoted to tiger conservation. A spate of articles were published in these issues regarding tiger conservation and related matter. But to our dismay very few comments were received from our readers. While compliments and letters of appreciation give us encouragement and inspiration, genuine adverse comments help us correcting our mistakes and improving things. We would, therefore, welcome letters, reports and observations both from members as well as subscribers in respect of the task the Society has set itself to carry out.

'Cheetal' is the official organ of the Wildlife Preservation Society of India. Its aim is to serve as a watch dog for wildlife and to keep the members and through them the public informed of the progress and works of the Society in the preservation of wildlife in India. But to completely fulfil the purpose the journal must receive more support from the members, who should contribute actively to maintain and improve its standard and enliven their interest in wildlife conservation.

We are not the pioneers in the field of wildlife preservation and publication of journal on wildlife. There have been previous attempts at wildlife preservation and also publication of journals. In 1930s there was the Northern India Association for protection of wildlife, which was largely confined to Punjab. This organisation was Government sponsored and worked for wildlife preservation in Punjab for many years. In erstwhile United Provinces a society was formed in 1930s, called the Society for the Preservation of Wildlife. For a few years it produced a journal called Indian Wildlife. It was edited by the legendary Jim Corbett and Hasan Abid Jaffry from Lucknow. The Second World War put an end to this society and the journal. These and many more in recent past faded and vanished with the passage of time. That the Wildlife Preservation Society of India survived till to-day is testimony of the hard and dedicated work of the people who steered it for the past 40 long years and the support lent by the members.

But there is no room for complacency. We should be under no illusion as to the magnitude of task before us which is to awaken the general public and persuade those concerned to protect the wildlife more efficiently than is being done at present. Our efforts are to be viewed in the context of present day circumstances where the wildlife preservation is confronted with heavy odds which quite often set our efforts to naught. The Wildlife Preservation Society and the 'Cheetal' deserve unstinted support, both moral and material, from the conservationists in general and members of the Society in particular, who should look upon it as their foster child and do all they can to nurse it up into more useful and serviceable tool for wildlife conservation.

"CARRYING CAPACITY"—AND INDIA'S WILDLIFE

By

Late M. Krishnan

(Reproduced from 'Cheetal' Vol. XV-1972-No. 2)

The concept of carrying capacity, popular among theoretically-minded conservationists today, is by no means modern and goes back to the empirical knowledge of livestock breeders. It is a logical concept, based on certain presumptions from which mathematical calculations are made cautiously, allowing various margins of safety. Reviewing my field experience of our wildlife in many different parts of India over the past 25 years and more, it seems to me that carrying capacity calculations as now made, are capable of leading one to fallacious conclusions (the risk in logic is always fallacy) and that it can be positively dangerous to place over-much reliance on such reckonings in planning our wildlife conservation.

In saying this, I must make three things unmistakably clear. First; I fully appreciate the fact that informed naturalists (as opposed to armchair experts) do not think of carrying capacity calculations as infallible or irrefutable figures, but only as a method of estimating the capacity of an area to support animal populations that is more reliable than an educated guess. Second, I write exclusively with reference to India's wildlife : elsewhere, where conditions are different or more artificially sustained such reckonings may have a more realistic value. Third, I am all for trying to gain a better knowledge of the needs of our flora and fauna—this is no biased comment on a sound, scientific method by an old-fashioned crank, but the questioning of the soundness of a method, currently very much in vogue in our country, by a scientifically educated naturalists, solely in the interests of scientific integrity.

The method now in use of determining the carrying capacity of any tract with regard to a particular wild herbivore inhabiting it, may be summed up as follows. The perimeter and area of the tract are first determined, and the vegetative tracts within it assayed; then, by means of transects, samplings, or more comprehensive estimates of the vegetation, the quantity of fodder available during the leanest times of the year in this tract is calculated, and on the basis of the daily intake of each individual of the species and the total population of the species in the area, the gross daily (or periodic) requirements are arrived at. Refinements of this method are parametric calculations based on unit mass of fodder and unit mass of the species being studied in some convenient term—for instance, one metric ton (tonne).

Another mode of estimating carrying capacity which is broader in its base and not confined to a particular species, currently in vogue in Africa and America, is the

estimation of it in terms of biomass. Biomass has been defined as "the weight of a population of organisms per unit area"—in practical terms and in the context of this note, that would mean to total estimated weight of the herbivores of a preserve, in stock-units of 1000 kg. (or one tonne) per square mile or square kilometre, determined as closely as possible and for a specific period or particular time. This ratio, considered along with another or other similar area or areas supporting the same herbivores, gives one an objective basis for comparison.

Elaborate precautions are taken at each stage of such calculations, and contingent allowances made so as to invest the estimates with a reasonable measure of dependability. For example, what is felt to be "due allowance" may be made for infant and juvenile populations of a species during a period (the period under survey), or for births and deaths, climatic variations and aberrations and seasonal floristic changes. And what are sought to be determined from the statistics collected are not hard-and-fast figures, but only trustworthy estimations. All this sounds so eminently reasonable that one might well think that such estimates just cannot be out, or any way, far out. Such a confidence, however, is based largely not on the over-all truth, but on the compelling verisimilitude of logical and logistic arguments, and the verisimilitude of the many allowances made at each stage, after the basic presumptions. I question the bases originally presumed and not the subsequent, careful calculations, the fundamentals and not the superstructure, with specific reference to India's wild herbivores.

My misgivings in this matter may now be set out briefly, with illustrative examples from actual field observations.

The entire question of carrying capacity arises only when artificially imposed depletions and imbalances have already upset the balance of nature in a preserve. This is provably so. Imagine an adequate tract of forest where there has been so little human interference that the flora and fauna have subsisted naturally for years: obviously, there is no need for any strenuous effort on our part, by means of elaborate assumptions and laborious calculations from the limited data at our disposal, to determine the carrying capacity of the tract—the balance of nature that has maintained itself in the area all these years can safely be trusted to look after itself.

It is only when by human occupation or exploitation of a forest that the area becomes incapable of sustaining its wildlife (especially, when human activities in it have resulted in exotics invading the forest, or when its vegetative resources have been seriously depleted by intensive grazing or plantation work) that we begin to think of carrying capacity—and to the extent to which we are willing to have faith in our calculations of carrying capacity to remedy the situation, we betray our wholesale lack of faith in the recuperative power of nature. Is it not an indisputable fact that in our country today, in no sanctuary or faunal area has nature been given a chance to recoup by the area being freed of all human demands upon it?

To assess the carrying capacity of any sanctuary worth the name in our country and to try, by means of "controlled cropping" to limit the fauna within that calculated capacity, is a classical instance of putting the cart before the horse. Today, the tendency of many of our pundits, wherever there has been a serious upset of nature caused by human activities, is not to remove those depletory human influences but to limit the fauna to the estimated carrying capacity. Further, the tendency is to explain aberrant faunal behaviour not as a consequence of the depletive influences in the area, but as something caused by the too insufficient carrying capacity of the land ! For example, the rampageous behaviour of wild elephants has been attributed to insufficient fodder in places where human activities have not only depleted the native vegetation but also rendered life insecure and constantly disturbed to the animals !

In our preserves today, few of which are free from the depletions and imbalances introduced by human activities, the vital and most urgent necessity is efficient protection and the elimination of these deleterious human influences. Until that is done, and some time has elapsed thereafter, it would be idle to compute the carrying capacity of the area—and if such protection and withdrawal of adverse human influences results, as I think they must, in the wildlife settling down more or less, there would be no need for any computation.

Even after all allowances are made, the determination of carrying capacity depends on the presumption that a determinable population of several species of animals inhabits a known area for a period (say, a year) and that they feed efficiently on the available fodder. Every field naturalist knows that this is not so—and, fortunately, cannot be so, for otherwise our natural flora, which is as integral a part of our wildlife as the fauna, would have disappeared long ago.

Actually, most herbivores require a considerable range, even the less far-ranging of them like cheetal and sambar (X gaur and elephants). While it is true that within a large tract their feeding is conditioned by the availability of the best feeding locations (which keep changing with seasonal floristic and other changes), it is also true that they do not make the most efficient and intensive use of all such grounds, and that many other factors also condition their feeding.

In India, wild elephants in herds do not stay in the same area for any length of time. They arrive at a forest, and depart from it, mainly along the well known 'elephant walks' which are their established tribal travel routes (and not merely the routes followed by particular herds)—though, where they are much harassed by humanity, they may leave these old trails and shift "to fresh fields and new pastures" near human habitations which were originally part of the elephant country. Another herd may have preceded a herd feeding in an area, or may succeed it there; when feeding, a large herd breaks up into parties and members of each party keep together, but the parties themselves separate

(though they reunite periodically), and leave sizeable areas of rich vegetation untouched in the course of their traverse of a feeding ground—their feeding is extensive and somewhat haphazard, and not intensive. Further, elephants where free from human disturbance feed most economically, and only when near-human presence panics them, do they lay waste to entire fields, trampling down much more than they eat. Such rampageous behaviour and general aggressiveness towards man and his artifacts is the direct consequence of human usurpation of the immemorial homes of elephants, the constant disturbance and harassment caused by men, and the blocking up of their age-long travel routes by human agriculture and holdings. It has been estimated that an adult elephant consumes about 200 kg, of green fodder everyday : a herd with 20 adults in it would need, on this reckoning, no less than 4 tonnes a day, and in a month would demolish an entire forest. How is it, then, that at no time in the history of this ancient land has any single tract of forest been denuded by large herbivores such as elephants and gaur, when men have laid waste to a hundred square miles of forest within 2 years ?

Before answering this question,, I must firmly scotch the wholly misconceived claims of some men who say that wild elephants have laid waste to forest tracts in recent years. Where men have invaded elephant forests extensively and intensively (as in the Moyar-Masinagudi area of the Mudumalai sanctuary and the periphery of the Periyar sanctuary), constantly disturbing the great beasts and blocking up their 'walks', elephants do indulge in destructive activity, in their frustration, perplexity and panic. The fact remains that in the course of countless centuries not one acre of natural forest has been destroyed or depleted beyond redemption to its pristine luxuriance by wild elephants in India.

This is so because elephants feed extensively and somewhat at random, as already said, and it is no less so because their normal fodder is made up of renewable and annually renewed plant parts such as twigs and leaves, the aerial shoots of tall grasses and bamboos, fruits and even bark that is, surprisingly, renewed (as in the case of *Kydia calicina*) If elephants and gaur did not range far and shift feeding grounds periodically, and if the regeneration of the plants they feed on is not so much quicker than our computations suggest, so many forests would certainly have been destroyed by them—as they have been by men.

Furthermore, although they are the largest of land animals and spend most of their waking time feeding (elephants, unlike ruminants, feed slowly and continually, and not in intensive bursts) elephants do not always eat the most luxuriant or nutritious bulk fodder available. I have seen wild elephants laboriously gathering the minute, pink flowers of *Mimosa pudica*, spending ten minutes to get a tiny morsel in their trunk-tips. It is not only elephants that behave like this. Experienced naturalists know perfectly well that at times herbivores are not to be found where the vegetation is lush and rich, but in areas where what there is, needs to be sought and found laboriously. Sambar, for instance, spend days

nibbling at the 6-inch-high sprouts of up-and-coming grass in the black, fire-charred floor of deciduous hill-forests in February, when a little farther down there is fresh green fodder in bulk.

We should know much more about the feeding habits and gustatory preferences of our herbivores (whether such preferences are induced by seasonal vegetative changes, or by the compulsion of consciously ununderstood bodily needs) before we can afford to compute their needs. Everyone knows that at times elephants ingest the basal portions of the sheaves of dusted grass they place crosswise in their mouths, and at times the distal green blades, sometimes rejecting the blades and sometimes the stalk (culms) : one might conclude, logically, that it is a question of whether the green blades are fresh and comparatively free from silica, and whether the culms are starch-rich, that decides their preference in this matter. After having closely studied the portions of the sheaves that elephants reject in the course of such feeding, and also the clumps of grasses in their feeding grounds, I am sure it is difficult for a man to know what exactly guides their preferences—unless he were a grasss-eater.

Some forest fruits are avidly eaten by most herbivores when in season, such as ber (*Zizyphus* sp.), *Grewia* spp., *Diospyros* spp., *Gmelina arborea* and many legumes. The power of these trees and shrubs (and of many herbs, too) to attract herbivores when they are in fruits, is seldom taken into reckoning in computing carrying capacity.

When the sour drupes of *Spondias mangifera* are ripe, and when *Melia composita* is in bitter fruit, muntjac are drawn irresistibly to the trees; the fruit of *Terminalia bellerica* attracts sambar, and all deer love the round fruits of *Randia dumetorum*, noxious to man (even *Randia uliginosa* has to be sliced thin, washed carefully and then boiled to be fit for human consumption). There are, of course, a great many more fruits, and even flowers, that attract many animals and even jungle-living humanity. Is all this taken into account in reckoning carrying capacity, and in delimiting the periphery of the range of animals in an area?

Even if allowances were made painstakingly, for all such known attractions, they may not always be realistic. I have seen a hill-forest carpeted 6-inch deep with bamboo seed, with not even junglefowl attracted to the feast. The weevils had taken over.

The reverse of such factors, not attraction but repellence, is much more important in assessments of faunal life. This has not even been thought of in the concept of carrying capacity. There are exaggerated notions current about the power of the dhole (wild dog) to drive away all other animals when they enter a faunal area, but even taking legend at face value, the dhole is certainly a long way behind man in the power to scare away forest animals. Wild animals just cannot stand men on foot (in India) and where noble sportsmen hunt them from jeeps with searchlights, they are terrified of motor vehicles, too. In areas where there is much hunting and poaching, or where these were major factors affecting the fauna till recently, such as in Orissa, Andhra Pradesh, parts of Bihar and parts

of Uttar Pradesh, even animals that are largely diurnal where they are not disturbed, like cheetal, sambar, and gaur, have turned into fugitive creatures of the night that flee at the sight or smell of man, and shelter in cover all day, coming out only with dusk and retreating into cover at dawn. Even otherwise, cover is one of the primary requirements of most wild animals, and when sheltering in cover they do not feed much—even where the cover is edible, their retreat and feeding urges and behaviour are different. Has this vitally important factor, cover, been taken into consideration in reckoning carrying capacity?

I may end this by repeating what is really important in wildlife conservation in India. It is not management technique today, but protection from every kind of hunting, and human depletive influences, whether or not these are intended.

One of the main reasons for depletion of wildlife has been habitat loss. The forest area has shrunk and competition between wild herbivores and domestic cattle for grazing has become keen. Efforts are on to release captive bred wild animals in their natural habitat to replenish the diminishing wildlife. But will the captive bred wild animals find their new home congenial and supportive? It is, therefore, important to assess the carrying capacity of such forest before releasing wild animals in them. This is an essential part of conservation programme.

—Editor

STUDIES ON TETRAPODES OF BHIMBANDH SANCTUARY, BIHAR

By

Yadunath Prasad Sinha*

The Bhimbandh wildlife Sanctuary is situated in the famous Kharagpur Hills in Munger district of Bihar. It extends over an approximate area of 681-90 sq. kms. and lies between 24° 55' and 25° 15' North Latitude and between 86° 15' and 86° 33' East Longitude. It is surrounded on the north by Gaya-Sahibganj Railway road line, on the west by Kiul-Howrah main railway line, on the south also by Howrah-Kiul main line and on east by Jamui-Munger Road. The nearest railway station is Jamui, about 35 kms. south of this place. It consists of 24 villages in core area and 25 villages in buffer zone. The area has been declared and notified as wildlife sanctuary on 27th May 1976 under wildlife act 1972.

Bhimbandh sanctuary represents many ecosystems with various types of flora and fauna. Availability of water and its distribution plays a vital role for the survival of the forest biodiversity. There are many perennial streams and nalas in the sanctuary and a beautiful Kharagpur lake nearby. Morway river flowing from east to west and Anjan from north-east to south-west mainly constitute the perennial source of water for the sanctuary. The source of water is due to bulk rainfall received from middle of June to early October every year. As per record for 1980 the annual average rainfall for the sanctuary as a whole is about 1197 mm.

The climate of this area can be described as the mean between the scorching heat of the west and moist of the east. The hot weather starts from the middle of March (mean max. temp. 31.72°C as per record for the year 1980) and ends in the middle of June (mean max. temp. 34.43°C) and then after monsoon breaks in the third week of June and continues till the beginning of October. Winter begins from November (mean min. temp. 16.55°C as per record for the year 1980), goes down in December (mean min. temp. 11.44°C)-January (mean min. temp. 11.16°C) and ends slowly in the middle of March. The spring is very short, starts usually in February and ends in early March.

Sal (*Shorea robusta*) is the main tree species of the forest of this sanctuary mixed with its main associates such as *Terminalia tomentosa*, *Terminalia arjuna*, *Pterocarpus marsupium* and *Adina cordifolia* in top canopy; *Buchnanania latifolia*, *Madhuka indica*, *Croton oblongifolius* etc. in middle canopy; and *Casearia tomentosa*, *Flemengia chapper*, *Indigofera* sp. etc. on the ground.

The northern dry mixed deciduous forests with bamboo as understorey occur both on plains and hills where the soil is shallow and degraded. Besides these forests, all dry

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locations like hill tops and ridges and other places have considerable salai trees (*Boswellia serrata*). In the dry bed of rivers and streams, *Saccharum spontaneum* is seen everywhere.

The villages inside the sanctuary are allowed to collect firewood, leaves, roots, tubers, Mahua flowers and seeds etc., by virtue of the concessions granted to them. Kendu leaves and sal seeds are collected by forest Development Corporation. Domestic cattle are competing with wild animals for food and water. Men and ponies move inside the buffer area and cause lot of disturbance to wild animals. There is lot of conflict between wild animals and villagers engaged in cultivation of food crops in close vicinity of forests. These crops are sometimes damaged by wild animals.

Therefore, maintenance of ecosystem and preservation of wildlife depends upon the awareness of human beings living inside the sanctuary or coming as intruder with their cattle. The selection of species for planting inside the sanctuary should be oriented towards the food requirement of wildlife. The core area of the sanctuary (about 183.87 sq. km.) has plenty of amenities for big wild animals but the situation in buffer zone is not so good.

Tetrapodes of the sanctuary is applied for all four-footed animals viz. amphibians, reptiles, birds and mammals. The present studies are based on field observations during 2nd to 12th December 1997 and authentic information obtained by Forest Guards, Range office and local people.

Amphibians have been observed under stones, among green grasses and under logs near water in the core area and near houses in the villages. These are *Rana tigrina* Doudin and *Rana limnocharis* Wiegmann of the family Ranidae and *Bufo melanostictus* Schneider of the family Bufonidae.

Twelve species of *Reptiles* belonging to ten families found in this sanctuary are : (1) Crocodiles (*Crocodylus palustris* Lesson) of the family Crocodylidae are frequently seen in Kharagpur lake and Kalidah (near Rameshwar Kund). (2) Water snakes (*Enhydryis* Schneider) and (3) Grass snakes (*Natrix piscator* Schneider) of the family Colubridae are common in pond and among moist grasses respectively in the sanctuary. They generally feed upon frogs, toads, fishes, small rodents and insects. They are harmless creature. (4) *Typhlops* sp. of the family Typhlopidae is black above and lighter below with the snout. It is found under stones or on the moist ground. It is also non-poisonous. (5) Common kraits (*Bungarus caeruleus* Schneider) of the family Elapidae is highly polished and shining snake, generally found in low altitudes in and around villages, near human habitation and frequently available in the agriculture fields. It is usually of dark colour with the scales along the middle of back enlarged and hexagonal. Its food comprises small mammals like rats, lizards, frogs, toads and fishes. Kraits are oviparous and their eggs are found in the holes in the ground. The females take utmost care of the eggs. (6) The cobra (*Naja naja* Linn.) belonging to the family Elapidae,

is found in the fields generally in the night, near human habitation (7) Common Indian Python or the Rock Python (*Python molurus* (Linnaeus) of the family Boidae is occasionally seen in Narokola. it is an impressively large and hefty snake. Its length ranges from 2.5 to 6 metres.

Due to lack of knowledge common people, sometimes, kill the non-poisonous snakes in confusion. Actually, in poisonous snake, the poison gland occupies a space behind the eye and stretches backward depending upon the size of the gland.

(8) The common Indian Monitor (*Varanus bengalensis* Linnaeus) of the family Varanidae has been seen on Sissu (*Dalbergia sissoo* Roxb.) and Babul (*Acacia* sp.) trees. This monitor is a good climber and swimmer. According to local people, it bites hard, lashing with the tail and scratching with its powerful claws when people want to catch it alive. It feeds generally on small terrestrial vertebrates and arthropods and breeds between July and September. Eggs are deposited in holes in a clutch of 19 to 30 eggs and are covered with leaves and rubbish.

The population of the common Indian Monitor is decreasing day by day due to excessive exploitation of this lizard by tribal people for commercially valuable skin and flesh (used as food and extracting oil for medicinal value).

(9) Indian Garden Lizards (*Calotes versicolor* Daudin) of the family Agmidae has been seen climbing on the trees and bushes and running on the ground. It is arboreal and its prehensile toes and long tail helps in balancing the body for arboreal mode of life. It is mainly insectivorous and breeds in summer (May to June). At that period males acquire brilliant breeding colour and become aggressive towards other males.

(10) The common Bark Gecko (*Hemidactylus leschenaulti* Dum. and Bibr.) of the family Geckonidae with cross bars on the back, a black stripe behind the eye and whitish belly, was seen in the crack of trunk of a mango tree. It is insectivorous. Most of the females are found gravid during March to May.

(11) The common Indian Skink or Black striped skink (*Mubuya carinata* Schneider) of the family Scincidae was found moving on the accumulated stones near a house and at last vanished inside the stones. It was dorsally shining bronze colour with a black longitudinal line passing laterally behind the head to the tail and ventrally yellowish-white. It is insectivorous, diurnal and oviparous. It lays 22 or 23 eggs in a clutch.

(12) A brownish snake-eyed Lacerta (*Ophisops microlepis* Blanford) of the family Lacertidae with two light dorso-lateral stripes on each side, was seen on the piles of loose stones near water under tree shade. It vanished after a slight disturbance among the stones. After turning stones, besides this animal we also found black scorpion, small frogs, centipedes, millepedes, Isopods etc.

Twenty six species of *Birds* belonging to 17 families have been observed in the core area as well as in the buffer zone. These are the Tawny Eagle (*Aquila rapax* Temminck) and kite (*Milvus migrans* Bodder) of the family Accipitridae; Vulture (*Gyps bengalensis* Gmelin) and the Lazaar Falcon (*Falco biarmicus jugger* Gray) of the family Falconidae; Pigeon (*Columba livia* Gmelin) of the family Columbiadae; the Barn owl (*Tyto alba* Scopoli) of the family Tytonidae; Blue Jay or Indian Roller (*Coracias benghalensis* Linnaeus) of the family coraciidae; common Swallow (*Hirundo rustica* Linnaeus) of the family Hirundinidae; Golden Oriole (*Oriolus xanthornus* Linnaeus) of the family oriolidae; the common Green Bee-eater (*Merops orientalis* Latham) of the family Meropidae; little Egret (*Egretta garzetta* Linnaeus) of the family Ardeidae; the common Pea-fowl (*Pavo cristatus* Linnaeus), the Jungle Bush Quail (*Perdica asiatica* Latham) and the Grey Partridge (*Francolinus pondicerianus* Gmelin) of the family Phasianidae; Large Pied horn-bill (*Anthracoceros malabaricus* Gmelin) of the family Bucerotidae; the common Night-Jar (*Caprimulgus asiaticus* Latham) of the family Caprimulgidae; the Black Drongo or King Crow (*Dicrurus adsimilis* Beddard) of the family Dicruridae; the Paradise Flycatcher (*Terpsiphone paradisi* Linnaeus) and the Jungle Babbler (*Turdoides striatus* Dumon) of the family Muscicapidae; Red-vented Bulbul (*Pycnonotus cafer* Linnaeus) of the family Pycnonotidae, Indian House Crow (*Corvus splendens* Vieillot) and Jungle Crow (*Corvus macrorhynchos laivallantii* Lesson) of the family Corvidae; and the Jungle Myna (*Acridotheres tristis* Linnaeus) and the Pied Myna (*Sturnus contra* Linnaeus) of the family Sturnidae.

Regarding *Mammals* of the sanctuary, authentic reports on presence of 28 species belonging to 24 genera, 17 families and seven orders have been found. These are :

(1) The Bandar or Rhesus Macaque (*Macaca mulata* Zimmermann) of the family Cercopithecidae was seen by us in a group of 50 numbers including males, females and young ones of different ages in buffer zone. It has been observed feeding on tender leaves, flowers and fruit of Sal (*Shorea robusta*), Ber (*Zizyphus* sp.), Mango (*Mangifera indica*), Mahua (*Madhuca indica*), Bija Sal (*Pterocarpus marsupium*), Saja (*Terminalia tomentosa*) etc. in the sanctuary. It prefers open area unless driven to shelter in dense forest. It often mingles with human beings. It is not killed due to religious sanctity attached to it.

(2) Common Langur or Hanuman Monkey (*Presbytis entellus* Dufresne) of the family Cercopithecidae is purely vegetarian. It eats wild fruits, flowers, buds, young shoots and leaves. It has lost all fear of man but forest dwellers are more shy. It was also found in about fifty numbers in buffer zone. The enemy of the langur is panther. During observation period, one monkey was run over by a bus and killed when it was crossing the road.

(3) Once tiger (*Panthera tigris* Linnaeus) of the family Felidae was found in the forest but now it has not been seen since long time. It has either vanished or is on the verge of extinction in the sanctuary due to denudation of thick forest for making roads, cultivated fields and for establishing hamlets inside the sanctuary.

(4) A Panther or Leopard (*Panthera pardus* Linnaeus) of the family Felidae is not only restricted to forests but also thrives in rocks and scrub forest. It is found all over the sanctuary but their number has not been ascertained. It preys upon cattle, deer and monkeys and large rodents like porcupine. Panthers living near human settlement prey mainly on domestic cattle, sheep, goats etc.

(5) The Dhole or wild dog (*Cuon alpinus* Pallas) of the family Canidae hunts by day and rarely by night. It is found in this sanctuary but their number is not large.

(6) The wolf (*Canis lupus pallipes* Sykes) is generally found in open country but also remains in the forest as well. People encounter this animal in the vicinity of villages while they come to prey on their cattle. Away from human settlement, they prey on hares, birds, porcupine and other small prey animals.

(7) Jackal (*Canis aureus indicus* Hodgson) and (8) fox (*Vulpes bengalensis* Shaw) of the family Canidae was once common in the sanctuary, is not seen now-a-days. They depend generally on the kills of panthers.

(9) Striped hyaena (*Hyaena hyaena* Linnaeus) of the family Hyaenidae is often found on the outskirts of forests and villages. In this sanctuary one often comes across hyaena. Animal remains left by the carnivores are the usual food of the hyaena.

(10) The large Indian Civet (*Viverra zibetha* Linnaeus) of the family Viverridae is sometimes seen by villagers in the dense growth of *Saccharum spontaneum*.

(11) The common Mongoose (*Herpestis edwardsi* Geoffroy) of the family Herpestidae generally avoids thick forest and is found near villages among cultivation and gardens. It hunts both by day and by night. It preys on rats, mice, snakes, lizzards, frogs etc. It was seen by us in a group of three numbers among bamboo brackets.

(12) Sloth Bear (*Melursus ursinus* Shaw) of the family Ursidae is often seen in the forests of this sanctuary. Fruits and flowers, vegetable material, honey and insects are its main food. It is also seen breaking the termite mounds available in the sanctuary.

(13) Sambar (*Cervus unicolor* Kerr), (14) Spotted deer (*Axis axis* Erxleben) and (15) Barking deer or Kotra of the family Cervidae is often found in the forested hill sides in the sanctuary. They are fairly diurnal in habit and sometimes go out to graze near cultivation. Their food consists of various leaves, grasses and wild fruits.

(16) The Nilgai (*Boselaphus tragocamelus* Pallas) of the family Bovidae is sometimes seen on foot hills foraging during day time.

(17) The wild Boar (*Sus scrofa* Linnaeus) of the family Suidae occurs in the sanctuary. Roots, rhizomes and tubers etc. of some of the plants available in the sanctuary such as *Salmaal malabarica* and Bamboo are very much liked by wild boar.

(18) The crested Porcupine (*Hystrix indica* Kerr) of the family Hystricidae is nocturnal in habit. It lives either in burrow or rests in thickets and tall grasses. Like wild boar, it also likes to feed on roots, rhizomes and tubers of the plants.

(19) Indian Hare (*Lepus nigricollis* Cuvier) of the family Laporidae is found among bushes, tall grasses etc.

(20) Lesser Bandicoot Rat (*Bandicota bengalensis* Gray and Hardwicke), (21) House rat (*Rattus rattus* Linnaeus) and (22) House Mouse (*Mus musculus* Linnaeus) and (23) little Indian Field Mouse (*Mus booduga* Gray) of the family Muridae are found near cultivation in the villages. (24) Squirrel (*Funambulus pennanti* Wroughton) of the family Sciuridae was also seen by us on the mango tree.

(25) House Shrew (*Suncus murinus* Linnaeus) of the family Soricidae is found near houses inside the sanctuary.

(26) Indian Flying Fox (*Pteropus giganteus* Brunnich) of the family Pteropodidae was seen in about 100 numbers on *Eucalyptus* tree in a village near sanctuary.

(27) Lesser yellow Bat (*Scotophilus kuhli* Leach) and (28) Greater yellow Bat (*Scotophilus heathi* Horsfield) of the family Vespertilionidae was obtained from the crown of Palm tree and from a hollow of a mango tree respectively.

In the end, the author wants to express his gratitude to the Director, Zoological Survey of India for providing facilities in connection with this study and thankfulness to the Range officer, Kharagpur, members of the party and to Sri R.B. Sharma, Photographer for help in the field at the time of taking observations and collecting data from various sources.

**STUDY THE PROCESS OF RESIDENT MALE CHANGE IN A UNIMALE
BISEXUAL GROUP OF HANUMAN LANGUR, *SEMNOPTHECUS ENTELLUS*
AROUND JODHPUR, RAJASTHAN**

By

L.S. Rajpurohit and A.K. Chhangani*

Abstract

The present study of the male band invasion and the resident male change in a unimale bisexual group of Hanuman langur (*Semnopithecus entellus*) at Beriganga around Jodhpur, Rajasthan is documented. 16 individuals (8 adults, 5 subadult and 3 juvenile males) was first seen near Beriganga bisexual group on 26.04.97 and visited frequently to this group before they finally discarded the resident male on 13.7.97. The resident male was severely injured left leg and ousted. He was seen in this male band after ousting from residentship. It was a multimale situation for two days and after regular interaction for 11 days the males of that male band were eventually chased by new resident male (the highest ranking adult male from male band) and the resident male change process was over on 23.7.97. Before a new birth observed in this group on 23rd the size was 63 animals (i.e. 1 adult male, 33 adult females, 2 subadult females, 6 juvenile females and 21 infants of ages varying 2 weeks to 14-15 months). There are 4 black-coat infants (including new born), the new resident regularly receiving at least one estrous female and mated successfully. He was not found aggressive except on two incidents during the take over (i.e. 14.7.97 to 23.7.97) in which he ran behind and chased infant carrying females. There is no male juvenile available in bisexual troop for him to expel out of the natal troop. Of total 35 females, 14 females are free (without carrying infants) and 9 females' infants are already white coat means they also start cycling now. This might be the reason for not killing young infants as he receives 1-2 females in estrous every day.

Introduction

The Hanuman langur (*Semnopithecus entellus*) is the best studied and most adaptable South Asian Colobine. They live in a wide range of habitats, from moist deciduous forest to scrub and open rocky areas, like Jodhpur and in villages, and towns and on cultivated land (Roonwal & Mohnot, 1977; Wolfheim, 1983). The two basic types of social groups are the bisexual troops and the all male bands.

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A variety of social changes are met in this species. Resident male replacement or change is one such important social event which can be easily documented (Mohnot, 1994; Rajpurohit, 1987; Sommer & Rajpurohit, 1989). The present paper evidences the process of resident male replacement once again in one unimale bisexual troop of langurs at Beriganga, Jodhpur.

Material and Methods

The present field study has been conducted in 1997 (April-July, 1997) on Hanuman langurs at Jodhpur, Rajasthan (Altitude about 241 m, latitude $26^{\circ}18'N$, longitude $73^{\circ}08'E$) based on scan and adlibitum samples collected (Altman, 1974). During the study, the number of langurs in this genetically isolated population of Jodhpur langurs in an area about 85 sq km found about 1750 individuals. Due to fusions and fissions, the number of bisexual troops varied between 30 and 34, most of them being one-male (harem) structures. There were 13-14 all-male bands. The bisexual troop had 10-125 numbers (average 39) while all male bands 2-31 (average 13.2).

The habitat used by these langurs includes open scrub forests, fields, farms and orchards (Mohnot, 1974). Water is available to all groups throughout the year from man-made ponds which collect rain water (Mohnot et al. 1987). The animals are well habituated to artificial feeding by local people.

Study Groups

The langur groups are distributed over a 30 km diagonal ridge running from the village Arna in the west to Daijar in northeast passing through Jodhpur fort. The reare no other langur groups within a radius of 100 km except few solitary or duo in Osian and Mewasa.

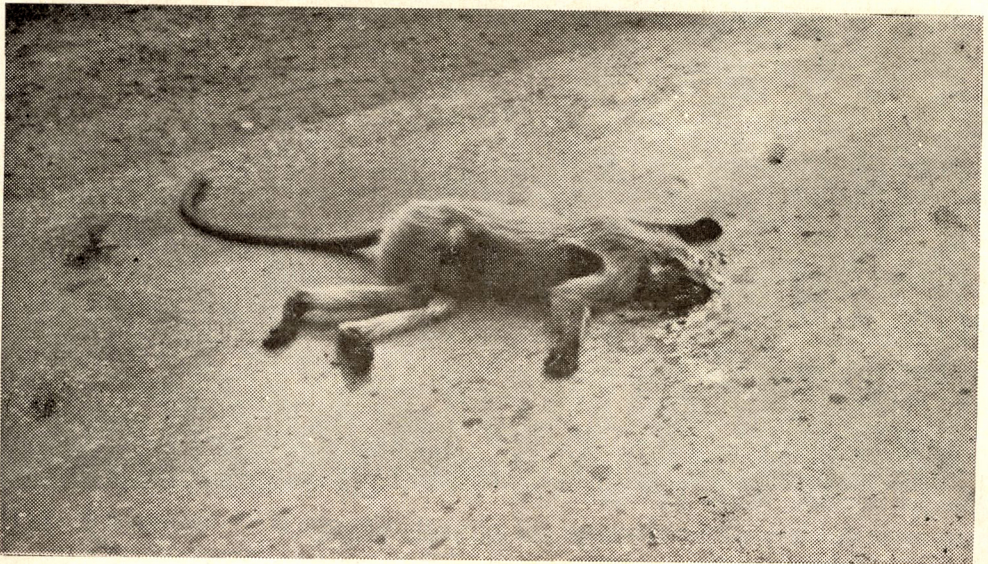
The study group-Beriganga (B3) lives about 15 km north of Jodhpur city station. There are two all-male bands (AMB) in this area named AMB2 and AMB2A. Beriganga bisexual group (B3) comprising total 63 individuals (i.e. 1 adult male, 33 adult females, 2 subadult females, 6 juvenile females and 21 infants) was invaded by AMB2A having 16 males (i.e. 8 adults, 5 subadults and 3 juvenile males) during July, 1997. A new birth took place in B3 troop on 23.7.97 during the resident male change process.

Observations and Results

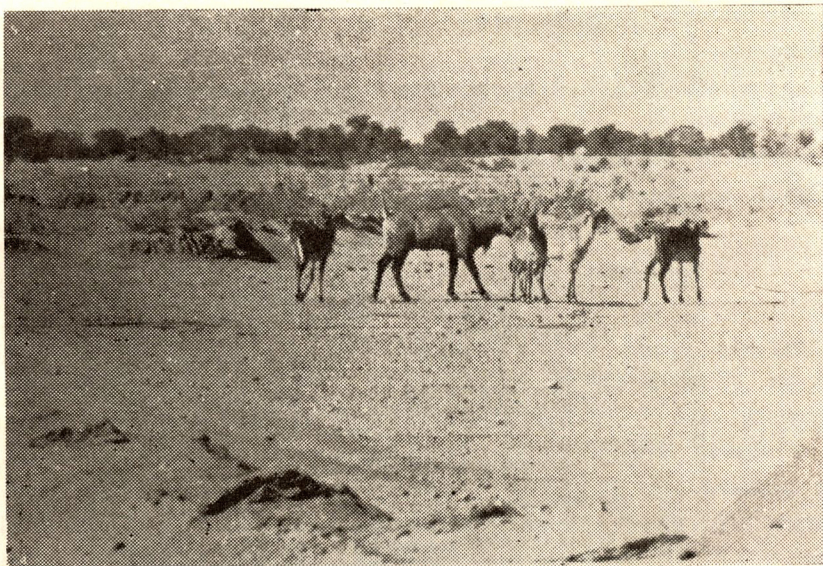
An alpha or resident male of one male bisexual group in Hanuman langurs is generally replaced every three-four years of tenure. This tenure of residentship varied from few days to over six years (Rajpurohit, 1987; Rajpurohit et al. 1995). On the basis of observation and events the whole process of take over can be divided in three stages : viz. male band invasion and dislodging of resident male, the multimale stage and the take over by new adult male followed by chasing away the male band males.



Young angry Hanuman Langur (*Presbytis entellus*)
(See article on Page 13)



Langur crushed by a Vehicle on the road passing through the sanctuary.
(See article on Page 13)



Rajh (Nilgai)—bisexual herd near Jodhpur
(See article on Page 36)



Nilgai doe with four fawns.
(See article on Page 36)

(1) Male band invasion and dislodging of resident male : All male band (AMB2A) comprising total 16 males (1 old, 5 adults, 2 young adults, 5 subadults and 3 juveniles) was first observed on 26.4.97 at Beriganga. The male band occupied the temple and the roosting site of Beriganga bisexual troop (B3) at 5 00 p.m. The bisexual troop has moved for north and hidden in the bushes.

On 2.5.97, AMB2A males were observed again near Beriganga temple. But the alpha (resident) male of the bisexual troop is same and the troop observed normal in whole May, June, 1997. On July 13, 1997, male band invaded the bisexual troop B3 and after fighting with resident male, he was dislodged. The resident male of B3 was severely injured on left leg which bled to some extent.

(2) The male band occupation (multi-male stage) : The troop B3 is already under the occupation of male band AMB2A led by one bright young male July 13th onwards. This is the stage when all males of all-male band mingled into the bisexual troop and the resident or the future resident male is unable to chase them out of the troop. Many of the dominant males of male band are served by females through grooming, pseudo-presentation and even copulations.

On July 14, 1997 the troop B3 having all-male band mingled in it and the old resident (injured one) also seen with male band. There are chasing & re-chasing in these males. The young bright male (the probable new resident) shows his aggressiveness to the females and rival male as well. This type of regular interactions were continuously seen upto July 23rd, 97. This evening, when the new resident chased the males away, which didn't come back to the troop.

(3) Taking over by new resident male : The onset of residency of new resident of B3 the most dominant male of male band (AMB2A) documented July 24th onwards, as the males did not return to this group after they were chased away on last evening. Now the bisexual troop (B3) seems normal, a new birth was observed on July 23rd, 97. Including alpha male and the new born (also male) there are 64 individuals total. Of total 35 adult females 21 are infant carrying, the remaining 14 females are free. And 9 females which carry white coat infants might also recycling after lactational anorexia.

The new resident receiving atleast one or two females in estrous. There were successful matings observed. He has no male juveniles in this troop to expel them out. Altogether, it was a peaceful take over except injuring old resident, once or twice chasing-re-chasing the females of the group.

Discussion and Conclusion

Resident male replacement is one of the most important social change periodically observed in this species. It is essential that the old males should be removed to make room

for more bright and upcoming young adult males of the male bands. Females remain in their natal troops, forming a stable matrilineal core, whereas males move between troops and bands (Mohnot, 1974; Hrdy, 1977; Makwana and Advani, 1981; Roonwal & Mohnot, 1977). Langur population has been found to show considerable variation in the pattern of male replacement, the extremes of which are gradual male change and rapid take over (Newton, 1987; Rajpurohit and Mohnot, 1988; Rudran, 1973).

The resident male replacement in unimale bisexual troop of Hanuman langurs at Dharwar reported by Sugiyama (1965) in this well documented case the usurping male drove the resident male and immature males from the troop and killed infants still dependent on their mothers. Similarly Davies (1987) reported adult male replacement and group formation in *Presbytis rubicunda*. There are many studies evidenced for a similar pattern of resident change involving (1) resident male replacement by invading males, (2) expulsion of immature males, and (3) subsequent killing of infants. However, in this case, there were no juvenile males available to expel and there are large number of females (about more than 1/3rd of total i.e. 35) not infant carrying who can serve new resident male. The resident male replacement among langurs living in one-male troops illustrates its importance as a behavioural mechanism which maintain the group structure.

Acknowledgement

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OBSERVATIONS ON THE ECO-BIOLOGY OF RED MUNIA, *ESTRILDA AMANDAVA* (LINN.)

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Key Words *Estrilda amandava*, *nidicolous*, Parental care.

Abstract

The present communication deals with some observations on the Eco-biology of Red Munia, Estrilda amandava in outskirts of Bharatpur city. The observations were undertaken on nest building, clutch size, rearing of young ones and its predators. This nidicolous bird laid 4-5 white oval eggs. The altricial chicks were hatched out after an incubation of about 8 days. The helpless chicks opened their eyes after three days and the development of wings was completed in 10 days. Both parents reared the chicks for 15 days, afterwards the naives abandoned the nest.

Introduction

Seven species of Munias have been reported from Indian subcontinent (Ali and Ripley, 1983). Reports on white backed Munia (Thomas *et al.* 1996) and Spotted Munia (Sharma and Bhatt, 1996) are available. Reports on the general account of Red Munia, however, are available (Ganguly, 1975; Ali, 1979; Whistler, 1938; Jerdon, 1862) but reports on its biology in nature are very scanty, therefore, the present study was undertaken. Red Munia, *E. amandava* belongs to order Passeriformes, family Ploceidae and sub family Estrildinae. It is very bright and lively in their demenour and being tame and confiding, are easily captured and make delightful pets. It is included in Wildlife Protection Act 1972, schedule IV.

Materials and Methods

Direct observations with 10 × 50 optima Zenith Binoculars, from the side of a nearby bush, were recorded. Its presence was located outside the city near Moti Jheel area. The proposed habitat lies in the vicinity of Railway Bridge and composed of *Prosopis* spp.; bushes and perennial grasses on the margins of flooded canal. Observations were recorded daily.

Results

The results based on field observations are summarised hereunder :-

Nest Building

In the present observations recorded in nature, all the nest building material was collected by the male bird whereas female only organised and knitted it. The nest was built 1.5 ft. from the earth surface in a perennial bush surrounded by thick grass. It was a globular structure of the grass lined further with thin grasses and feathers. The male brought 70-100 grass scrapings in a day. Inner margins and the base was lined with 15-25 down feathers to make the nest smooth and cozy probably for maintaining the required temperature to retain heat for incubation of the eggs and secondly for the comfort of the altricial chicks. The nest was completed within 4 days and full vigilance was exercised by both partners. They did not allow the presence of other individuals in the territory. Any such attempts were immediately driven out.

Clutch Size

A clutch of 4-5 eggs was recorded in the present study. (Ali, 1975 reported 4-7 eggs, Whistler 1938; 5 or 6 eggs.) The 2nd and subsequent egg layings were noticed after two days of the first one.

Rearing of Young ones

Parent birds incubated the eggs for 7 days and hatching took place after 8th day. The helpless chicks opened their eyes after 3rd day. Young ones were fed by the parent birds but female's trips for feed were more than the male. The wings developed after 10 days and young ones were cared at the nest for 15 days, afterwards started flipping wings for short flights under the guidance, vigilance and training of the parent birds.

Predators

Only two incidents of unsuccessful swooping by Black winged kite were recorded. Crows and Snakes might also be preying upon as they were seen in the vicinity of the nests but no incidents of piracy were witnessed during the study.

Discussion

Pettingill (1969) reported that in no species of birds the incubation period is normally shorter than 11 days. The present findings of 8 days of incubation period, thus, disagree to it but are in consonance with Nice (1953) who stated that authenticated periods of less than 11 days are very rare. It can also be attributed to the findings of Lack (1968) of greater protection from predators offered by nest sites and hence the less need for a quickened pace in the nesting cycle. In the present case since less protection is offered by nest sites as the nests are open globular structures in bushes, therefore, quickened pace in nesting cycle is required. Moreover, Pettingill's findings on incubation periods might probably be more correct for the temperate region birds rather than tropical where the ambient temperatures are generally high which favours quick incubation.

Summary

The Biology of Red Munia reflected organised parental care.

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SEXUAL COLOUR DIMORPHISM IN THE INDIAN FRESH WATER TURTLE, *KACHUGA TECTA* (GRAY)

B.K. Gupta

Abstract

Sexual colour dimorphism was studied in 27 specimens of Kachuga tecta. which suggests that the turtles, having Carapace darker olive with red strips at the junction of costals and marginals, Plastron whitish yellow with dark blackish ocelli on the shields and red ocelli on central and lateral sides, oral scales around neck dark olive with white ocelli, Iris red and dorsal side of tail, dark olive with white longitudinal markings are 15 males in contrast to them 12 females retain light olive colour with light red strips on carapace, yellow with light black bands on plastron, light olive with white ocelli on oral scales around neck, pink Iris, and light olive on dorsal side of the tail.

Introduction

Although a good deal of work in the field of sexual dimorphism in snakes and lizards have been in practice in past, only few references are, however, available as regards the knowledge about turtles. The important work done in the field is of Evans (1951). Sachsse (1975), Christiansen and Burken (1979) Elghammer (1979) and McRae *et al.* (1981).

The turtles represent an ancient and highly specialized group with stereoscopic variations in different systems and have retained important primitive characters since mesozoic era (Pope, 1955). In India they are well known for their longevity and attachment with the Hindu mythology since ages. Their eggs and meat are a source of protienous food, carapace is rich in phosphate, calcium and gelatin. They also serve as natural scavenger in the river and ponds by consuming dead bodies.

Such an economically important animal in the service of human welfare is declining day by day not only in India but also abroad. For the purpose of their life history, reproductive potential and basic study to reveal the facts about the sexual dimorphism of these animals is essential, as this is a basic desideratum for further investigation.

Materials and Method

For this study, 27 specimens of *Kachuga tecta* of varying sizes were collected from the river Yamuna and its collecting channels of Agra and perennial ponds of Bharatpur by using traps and nets with the help of professional local catchers. The specimens were

kept in tank on vegetarian diet. Observations were made in the living, freshly killed and preserved specimens. Dissections were carried out to confirm the sex (Ashley, 1955).

Result and Discussion

After making minute observations on the 27 specimens collected, we found important differences in colour patterns between males and females of the species.

In males the colour of carapace is dark olive with red strips at the junction of costals and marginals, whereas in females the colour is light olive somewhat greenish with very light red strips at the junction of costals and marginals, however, Sachsse (1975) noted the uniformly black colour in males and ground colour with light markings in females of *C. reevesii* and olive brown with many ocelli on the occiput in males while the females lost their ocelli in *C. bealei*.

The colouration of plastron, scales around the oraland anal openings as well as in the tail region escaped the attention of morphologists, but in the present study a distinct variation has been noted. In males the colour of plastron is whitish yellow with dark black ocelli on shields and red ocelli on central and lateral sides, whereas in females the colour is yellow with light black band on shields without having red ocelli. Males have dark olive colour with white ocelli on the scales around the neck near oral opening while the females have light olive colour with white ocelli. In the anal region on the dorsal side of the tail dark olive colour with white longitudinal markings in males and light olive colour with yellow markings in females have been noted.

As in case of *Terrapene carolina carolina* (Evans 1951 and Elghammer 1979), in *Kachuga tecta* also the colour of the Iris is pink in females, however, it is comparatively dark (red) in males.

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INDIAN ELEPHANTS— NEED FOR CORRIDOR

By

K.N. Singh*

(Paper presented by the author in the 11th World Forestry Congress held in Turkey)

There are only two living species of elephants, the African elephant (*Loxodonta africana*) and the Asian elephant (*Elephant maximus*). The three regions of the world viz. the Indian subcontinent, Continental South East Asia and Island Asia constitute the abode for the Asian Elephants. The countries supporting the elephant population in these three regions are India, Nepal, Bhutan and Bangladesh in Indian subcontinent, China, Burma, Thailand, Kampuchia, Laos, Vietnam and Malaysia in Continental South East Asia and in Andaman Islands (India), Sri Lanka, Sumatra (Indonesia) and Borneo (Malaysia and Indonesia) of Island Asia.

2. Association with Human Life

In India elephant has been, since ancient times, closely associated with human life, art, literature and even religion. Ganesha, the elephant-headed god of wisdom and plenty, is a popular deity, hailed as the remover of all obstacles. Indra, king of lesser Gods and lord of rain, rides the elephant "AIRAVAT". It is also embodied in Jain myths, where Mahavira's mother dreamt of a four-tusked elephant when she conceived the saviour. Similarly Mayadevi, mother of the Buddha, dreamt that a white elephant entered her womb. This episode is often sculpted in friezes on Buddhist shrines, particularly at Barhut and Sanchi. The sanctity of the elephant, and its depiction in the arts, increased as it became a symbol of the Buddha, who is said to have descended to earth in the form of an elephant.

Ancient beliefs associating the elephant with the life-giving water led to the custom of coronation waters being poured over a king by a female elephant. An ancient ritual to invoke rain, involved anointing an elephant with sandal paste and then taking it in procession through the town. Admiration of the elephant's size and strength led to secular association with royalty.

3. Distribution of Elephant Population in India

(i) Historical :

Presence of elephants are recorded even from the dry tract of Punjab and Saurashtra in the fourth century B.C. There is mention of eight "Vanas" in country as abodes of elephants. Emperor Babur (1526-1530) has recorded in his memoirs;

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"Kalpi in U.P. as habitat of elephants" Abul Fazal's Aini Akbari (1555-56) records elephants in many parts of central India including Narwar, Chanderi, Satwar, Bijagarh, Raisen and Panna (all in present Madhya Pradesh). Emperor Jahangir (1605-1627) describes an elephant hunt in Dohad in the Panchmahal hills in Gujarat. Jordon (1874) gives elephant's distribution on the Himalayan foot hills from Bhutan west-wards to Dehradun, and in central India from Midnapur (West Bengal) to Mandla (Madhya Pradesh) and towards the south of Godawari. Sukumar mentions that the elephant has disappeared from Rajmahal hills only in the 19th century. Francis 1906 mentions that elephants were also seen in the Kalrayans during the mid nineteenth century. Imperial gazetter of India (1907) refers to many isolated herds of elephants in Northern and Central India like Nahan and Ambala (Haryana), Udaipur (Rajasthan), Bilaspur district (Madhya Pradesh and Pargal (Andhra Pradesh), all of which have disappeared since then.

(ii) *Present Elephant Habitats:*

Elephant habitats in India range from climax evergreen forests to dry thorn forests, swamps and grasslands. Among these the optimum habitats are the moist and dry deciduous forests. Till about the 5th century B.C. elephants used to live in practically the whole of India, but now the elephants in India exist in four disjointed populations—

(A) Southern India:

The elephants are distributed over forested hilly tracts of the Western Ghats and adjacent Eastern Ghats in the southern states of Karnataka, Kerala and Tamilnadu. Its range lies between $8^{\circ}15' \text{ N}$ - $15^{\circ}30' \text{ N}$ and $74^{\circ}15' \text{ E}$ - 78° E . The elephants habitat encompasses a diversity of vegetation types from dry scrub through deciduous forest to wet evergreen forest. With a corresponding variation in annual rainfall from 50 to 500 cm. elephants are found at altitudes from 100 m to over 2000 m above mean sea level. Nair Gadgil (1978), Nair, Sukumar and Gadgil (1980) and Sukumar (1985, 1986a) classified the distribution of Asiatic elephants within South India, into following ten region.

- (i) North Kanara, (ii) Crestline of Karnataka Western Ghats, (iii) Malnad plateau
- (iv) Nagarhole - Kakankote - North Wynad (v) Bandipur, Madumalai - South Wynad - North and East Nilgiris (vi) Eastern Ghats (South) (vii) Nilambur - West and South Nilgiris- Allpali Hills (viii) Nelliampathi - Anamalai Palani hills, (ix) Periyar - Elamalai - Varushanad hills (x) Agasthya-malai-Ashambu hills.

(B) Central India :

Elephant are found in dry deciduous, moist deciduous and semievergreen forests of the Eastern Ghats in Orissa and Bihar States. In Orissa population of 1300 elephants range over 1200 square kilometre area within 22 forest divisions. Of these 375 elephants

roaming in the Simlipal Tiger reserves (2750 km²) and 300 elephants roaming in the Simlipal George Sanctuary (127 km²) have secured habitats whereas the remaining habitats are deteriorating owing to felling of trees and shifting cultivation. Apart from a shrinking habitat another conservation problem is the seasonal hunting of mammals by tribes.

In Bihar atleast 235 elephants are distributed as three distinct populations. These include 65 elephants within a 1000 km² home range in Palamau Tiger reserve, 200 in the Singhbhum tract (2250 km²) and 70 in the Dalbhum tract (c-250 km²). In 1987 the elephants of Dalbhum had moved into the Midnapur district of adjoining west Bengal state. Singhbhum forests are known for Asia's largest single point deposit of iron ore and the future of this elephant habitat depends on how mining develops in the region. Tribal people are also destroying the habitat.

(C) North Western India and Nepal :

Along the Himalayan foot hills in the Tarai forest region of Uttar Pradesh, an isolated population of about 1,000 elephants ranges over the forest division of Dehra Dun, Siwalik, Haridwar, Rajaji National Park, Lansdowne, Bijnor, Kalagarh, Corbett National Park, West Tarai, Ramnagar, Haldwani, East and Central Tarai Forest divisions. Some of these elephant herds move into Nepal, another herd of about 30 elephant move to Dudhwa National Park and are reported since last five years to be living permanently in the area. The entire habitat has been fragmented into five segments.

(D) North Eastern India and Bhutan :

It was formerly thought that the north eastern region had a contiguous elephant range which are also extended into Burma. Now it is known that only a series of fragmented habitats exist, although it seems that solitary male elephants may still move across occasionally. These extend from the Himalayan foot hills of Bhutan and northern west Bengal eastwards into the states of Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram Tripura and Meghalaya. Some of the population also extend into Bangladesh and Burma. One of the largest elephant population in Asia extends along the Himalayan foot hills and plains from northern west Bengal eastwards through Assam, Bhutan and Arunachal Pradesh. A number of isolated population are also found to the south of the Brahmaputra.

4. Regional Population Dynamics

At present elephants are confined to forested, hilly tracts of north west, north east, central and south India (Sukumar 1986). The location of the four major elephant areas along with population figures as reported by Sukumar 1986, are tabulated :

TABLE 1

The number of wild elephants in India

Region	State	Area	Number
Northwest	Uttar Pradesh	Corbett NP Rajaji N.P. and other areas	525
Northeast	West Bengal	non-specific	155
.....	Arunachal Pradesh	non-specific	2000-4300
.....	Assam	Manas Tiger Reserve	1200
.....		Darrang West and East	400
.....		Dibrugarh	200
.....		Kaziranga-Naga Hills	1900
.....	Meghalaya	Garo-Khasi hills	2500-3500
.....		Rainti-Cachar	250-325
.....	Tripura	non-specific	120-150
.....	Manipur	non-specific	?
.....	Mizoram	non-specific	?
Central	Orissa	non-specific	2000
.....	Bihar	non-specific	310
South	Karnataka	north Kanara Crestline	100
.....	Karnataka	Malnd-Bhadra	100-150
.....	Karnataka/Kerala	North Wynad-Nagarhole	600-800
.....	Karnataka/Kerala	Bandipur-Mudumalai-Nilgiris	1200-1500
.....	Kerala/Tamilnadu	Nilambar-Palghat Hills	300-500
.....	Karnataka/Tamilnadu	Eastern Ghats (south)	1800-2000
.....	Kerala/Tamilnadu	Anaimalais-Palani Hills	800-1000
.....	Kerala/Tamilnadu	Periyar-Varushanad Hills	700-900
.....	Kerala/Tamilnadu	Agasthyamalai Hills	150-200
TOTAL			17310-22115

There has been no systematic survey of elephants in eastern state since 1985 except in North Bengal. The population is reported to be on rise. The elephant population in West Bengal has increased from 155 to 186 (1986-1992). In Uttar Pradesh the population has increased from 525 to 1000 (K.N. Singh 1993). The latest forest department Census figures for the four southern states sum up to well over 10,000. The possibility of the same elephant herds being counted more than once in the adjoining states can not be ruled out. However the population of elephants in India appear to be slowly rising or is being static at around 20,000. Rise in population in north eastern India in all probability is the outcome of the ban on capture of elephants for commercial purposes, Lahiry Chowdhary estimates that at least 6000 elephants were captured in 1961-1985.

5. Need for a Corridor

The minimum viable area for the conservation of elephant is related to the minimum viable population size and to the carrying capacity of the habitat. The carrying capacity of a rain forest is much lower than a dry deciduous forest. The carrying capacity vary from one elephant per 20 Sq. Km for rain forest to one elephant per 5 Sq. Km for Dry deciduous forest. The ideal habitat with a good mixture of grasslands might be able to sustain one elephant per 2 Sq. Km. The minimum viable area needed for long time conservation of elephant population would, therefore, be around 4000-5000 Sq. Km. Contiguous area of such a large extent is difficult to get.

Corridors play as important a role as link between elephant habitats through which herds can move unhindered. Corridors help the elephants to move to other habitats without having to go through human settlements and cultivations. The migration corridors between the population living in adjoining habitats are of crucial importance for making the habitats of reasonable size and also viable.

6. Suggested Corridors

For scientific management and sound genetical survival of the four disjointed elephant population, following corridors need to be preserved and maintained :—

(A) South Indian Population :

(i) Nilgiris and Eastern Ghats :

This is probably the largest reserve for elephants in terms of population size and covers an area of 11000 sq. kms. spread over the states of Karnataka, Tamil Nadu, Kerala and Andhra Pradesh. An estimated 5000 elephants occur in this reserve.

The vegetation over this reserve ranges from moist deciduous forest through dry deciduous forest to dry thorn forest. There are also plantations mainly of teak and eucalyptus in many divisions. There are also numerous human settlements in most of the divisions

excepting for Nagarhole and Bandipur. The major conservation problems include habitat degradation and fragmentation due to human settlements in places such as Hosur, Dharmapuri, Erode, Satyamangalam, Nilgiris North Wyanad, Bangalore and Kollegal. Elephant-human conflict in the form of crop depredation and human killing is also common in these areas. Poaching of tuskers was a serious problem in the past but has reduced in recent years.

Creating critical migration corridors such as Masinagude—Singara corridor in Madumalai, and Wyanad—Brahmagiri corridor in Kerala will be an important strategy for conservation.

(ii) Nilambur—Silent Valley—Coimbatore :

This reserve lying mainly to the south of the Nilgiris and north of the Palghat gap is estimated to have a population of 500-600 elephants spread over 2500 Sq. Kms in the states of Kerala and Tamil Nadu.

The vegetation includes large stretches of evergreen forests in Nilambur, New Amarambalam, Silent Valley and Attapadi, montane shola-grasslands in Nilgiri South and evergreen and deciduous forests in Coimbatore. Plantation forests are seen in areas such as Nilambur, Attapadi plateau and Coimbatore have numerous human settlements. Conservation problems include encroachments of evergreen forests, degradation of vegetation due to fire and human settlements and habitat fragmentation (in Attapadi).

Securing of corridors in the Attapadi Coimbatore region will be an important conservation strategy.

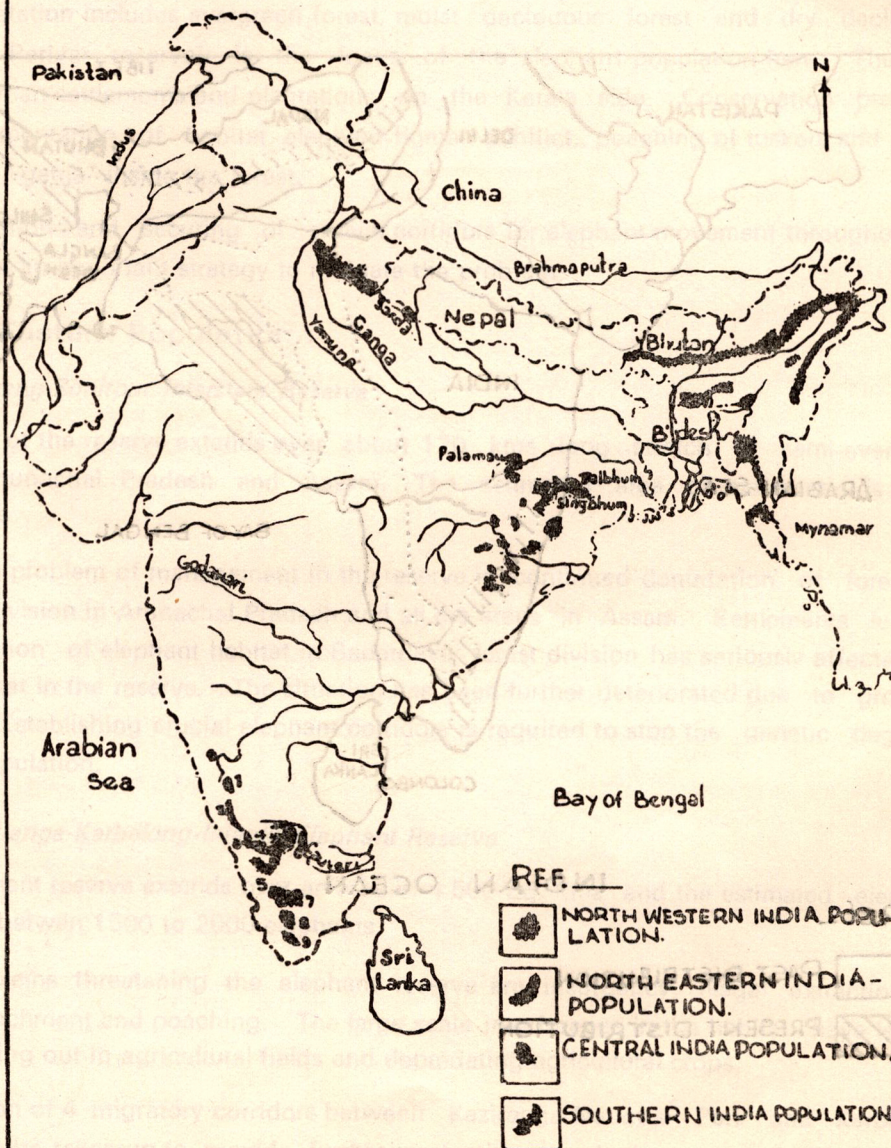
(iii) Annamalai-Parambikulam :

This reserve occurs to the south of the Palghat gap in the states of Tamil Nadu and Kerala. The total population of elephants is estimated at 1000-1200 spread over an area of about 3000 Sq. Kms.

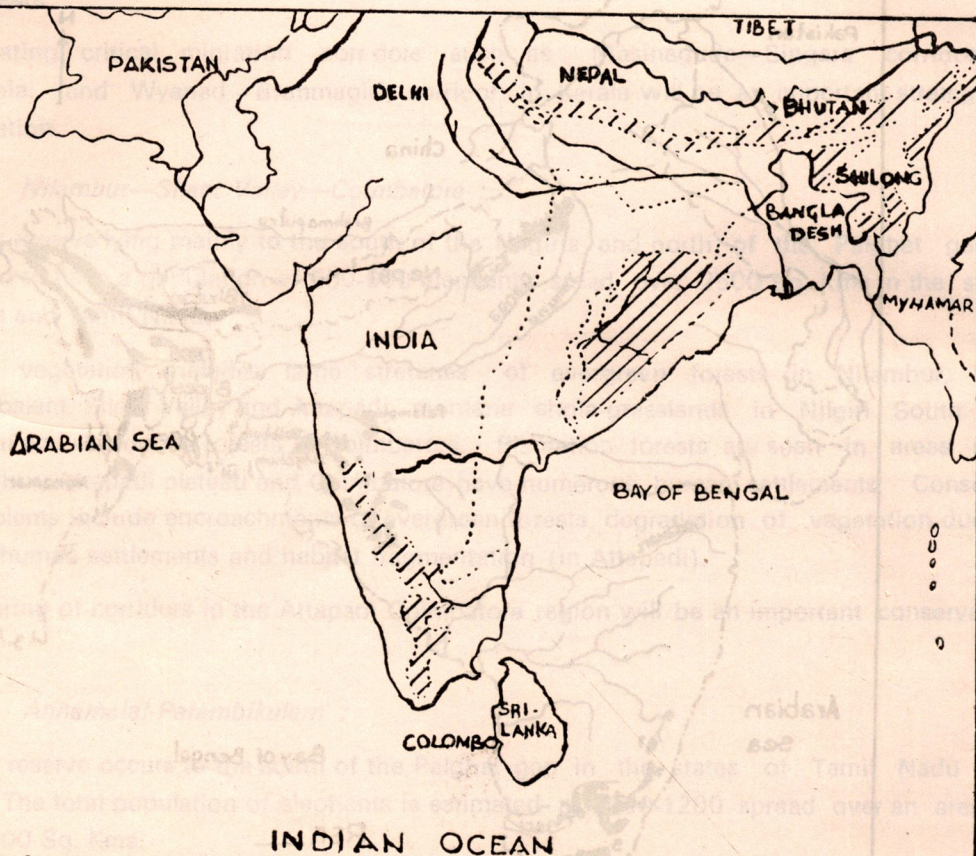
The vegetation is diverse and goes from wet evergreen forest to montane shola-grasslands, moist and dry deciduous forest and thorn forests. There are extensive teak plantations in Parambikulam. Numerous dams and canals of the Parambikulam—Aliyar project are seen. There are also coffee estates at the higher altitude in the Munnar Valparai region.

Conservation problems include habitat fragmentation by the network of reservoirs and canals (elephants have fallen several times into these canals), degradation of moist forests due to fire and poaching of tuskers. Important Conservation strategies will be to secure safe corridors for the migration of elephants.

THE FOUR DISJOINTED POPULATION ARE DEPICTED ON THE MAP



DISTRIBUTION OF INDIAN ELEPHANTS (past and present)



Ref.~

- PAST DISTRIBUTION
- PRESENT DISTRIBUTION

(iv) *Periyar Madurai :*

This reserve is spread over an area of about 3000 Sq. Kms in the states of Kerala and Tamil Nadu, The estimated population of elephants is about 1600-2000.

The vegetation includes evergreen forest, moist deciduous forest and dry deciduous forest. The Periyar reservoir is the focus of the elephant population here. There are numerous human settlements and plantations on the Kerala side. Conservation problems include fragmentation of habitat, elephant-human conflict, poaching of tuskers and illegal cultivation of "ganja" inside the forest.

Identification and securing of crucial corridors for elephant movement throughout the reserve will be an important strategy to mitigate the problem.

B. North Eastern Population :

(i) *Kameng-Sonitpur Interstate Reserve*

The area of the reserve extends over about 120 kms long stretch of semi-evergreen forests in Arunachal Pradesh and Assam. The estimated area of the reserve is about 7500 Sq. Kms.

The main problem of management in the reserve is continued denudation of forest of Bandardeva division in Arunachal Pradesh and all the areas in Assam. Settlements leading to fragmentation of elephant habitat in Bandardeva forest division has seriously affected the elephant habitat in the reserve. The situation has been further deteriorated due to growing insurgency. Establishing crucial elephant corridors is required to stop the genetic degradation of the population.

(ii) *Kaziranga-Karbelong-Intanki Elephant Reserve*

The elephant reserve extends over an area of 4 500 Sq. Kms and the estimated elephant population is between 1500 to 2000 elephants.

The problems threatening the elephant reserve are insurgency, illegal extraction of timber, encroachment and poaching. The large scale interference in the habitat have led to elephant straying out in agricultural fields and depredating agricultural crops.

Restoration of 4 migratory corridors between Kaziranga National Park and Karbelong forest, need to be taken up to provide further protection to elephants and facilitate their seasonal migration.

(C) North Western Population :

The most serious problem in conservation of elephants in Uttar Pradesh is the fragmentation of the elephant habitat. In the preindependence era there was total genetic continuity in the entire elephant population living in the sub-montane tract from the river Sharda to Yamuna. After attaining independence in 1947, significant stress has been on launching projects for improving the irrigation system as well as enhancing the existing power generation capacities coupled with construction and colonising activities and thus the major rivers of the habitat tract have been the resource-basins for the development projects. The major activities on some of the major rivers are enumerated below.

(i) River Yamuna : 13 km long power-channel and tunnel from Kulhal to Khara has been constructed and thus the power channel obstructs movement of elephants. A power station for generating 72 M.W. has also been commissioned.

(ii) River Ganga : During 1964-65 a large chunk of miscellaneous forests of Virbhadra block (Dehra Dun forest division) was deforested on the west bank of Ganga and Hindustan Antibiotics came up at Virbhadra. Hydel project at Chilla has been established with a 14 km long power channel running from Kunao to Chilla. Kunao and Chilla Chauras have been diverted for agriculture and residential purpose. Deforestation in Johra and Raiwala blocks also took place for resettlement purposes.

(iii) River Malan : The strip from Kandwashram to Kalalghati on the bank of the river has been used for constructing pucca houses, whereas a 3 meter wide canal was commissioned in 1980 over a length of 2 km. from Kandwashram downward.

(iv) River Khoh : Kotdwar-Lansdowne P.W.D. road was constructed parallel to Khoh river. This road construction has resulted in steep edges and building of walls which impede crossing by elephants (A.J.T. Johnsingh 1992).

(v) River Ramganga : Construction of a reservoir extending over an area of nearly 90 sq. km was started in 1970 and was commissioned in 1974.

(vi) River Kosi : The forests along the river Kosi from Dhangarhi to Garjia has been removed at few places and human encroachers have invaded the elephant habitat by using the stretch for agricultural and residential purposes.

(vii) River Gaula : P.W.D. metalled road connecting Haldwani to Nainital has been constructed parallel to Gaula river, and at the point where the Gaula river enters the flat land, V shaped valley is formed with steep edges upwards and the land situated down below has been put to agricultural uses and the major portion has been converted into residential colonies.

(viii) River Sharda : A hydroelectric power project has been installed on the river Sharda during the eighties.

Loss of habitat :

An area of 21623 ha. of forest land which was part of elephant habitat has been diverted for non-forestry development projects during the period 1947 to 1995. The natural vegetation has been altered through artificial regeneration of native and exotic plants. Substantial area has been diverted for Eucalyptus and teak plantations, which are useless for supporting elephant population.

Loss of food and water :

Indiscriminate lopping by gujars deprives the elephants of the leaf fodder, which forces them either to look for new area for forage or pull down the trees. Indiscriminate lopping and heavy grazing have not only affected the regeneration but also encouraged weeds like *Lantana camera*, *Cannabis sativa*, *Parthenium histerosporus* and *Cassia tora* covering more than 41% of the ground flora in Rajaji National Park (D.V.S. Khati, 1993). The areas of Ramganga reservoir extending over an area of 90 sq. km., Chilla and Kumao Chaur which were serving as a complete food range for elephants, have been diverted for other purposes (V.B. Singh 1986).

Clearance of forests in Nepal bordering Dudhwa National Park :

The forests of Nepal existed right up to the Indian boarder over long stretches. During the sixties the Nepal government adopted the policy of clearing these border forests to settle people from the interior of the country. In the process vast chunks of forest have disappeared not only along the border but also from areas inside the country.

Repercussions of the habitat changes :

The various man made structures on the major rivers viz. Yamuna, Ganga, Khoh, Ramganga, Kosi, Gaula and Sarda have obstructed the travel—path of the elephant and have thus resulted in fragmentation of the habitats into six parts. The fragmented habitats are the area lying between Yamuna-Ganga, Ganga-Khoh, Khoh-Ramganga, Ramganga-Kosi, Kosi-Gaula and Gaula-Sarda. The elephant population on either side of the rivers Ganga and Gaula are completely separated because of human interference on the banks of Ganga and Gaula in the elephant range. Stress need to be given to create and maintain corridors for saving the elephants from genetic drift, the following Corridors are suggested.

(i) Corridor for connecting Eastern and Western units of river Ganga :

Rajaji National Park is divided into two distinct geographical units by the river Ganges. The old Chilla sanctuary and the reserved forests around that form the eastern unit on the eastern bank of Ganges and old Rajaji and Motichur Sanctuary and reserved forests areas around form the western unit on the western side of the Ganga. Earlier there used to be

contiguous forests and in this way genetic exchange between the animals in the two geographic units were quite frequent.

During the last 50 years the animal habitat between Raiwala and Motichur on both the banks of Ganges were destroyed. This has restricted the animal movement across the Ganges and genetic exchange between the two populations almost stopped. The problem has further been compounded by construction of Kuno-Chilla power Channel.

Construction of corridor between Motichur and Chilla inside the Rajaji National Park so that elephants inside the Rajaji National Park can move freely between Chilla and Motichur areas need to be taken on priority basis. This corridor is about 1 km wide. The other corridor suggested is *BEENJ RAU* corridor which may connect the population on either side of Ganga.

(ii) *Kotdwar Elephant Corridor Connecting Rajaji National Park and Corbett National Park :*

Another corridor has been suggested between Rajaji and Corbett National Parks by (John Singh and Joshua). The total habitat available to the elephant in Rajaji-Corbett National Parks is about 3000 sq. km. which encompasses the above two national parks and the adjacent reserve forests. Affifullah Khan (1993) observes that both the reserved forest lying between Rawasan river and Sanah river form the largest corridor between Chilla and Kalagarh Forest division. Of importance within the larger corridor is the area between Malan and Khoh river inclusive of Tootgadhera block. There is an urgent need to protect and manage this area as one conservation unit using the elephant as a flagship species

(iii) *Corridor for the two population locked on either side of the river Gaula :*

The human population settled on either side of P.W.D. road along Gaula river from Haldwani to Ranibagh has completely obstructed the migration routes and elephants have abandoned migration to either side of Gaula since the last fifty years. There appears to be no possibility of exploring the creation of corridor for connecting the two population locked on either side of river Gaula. Wildlife researches need to take up this problem as a challenge and suggest measures for translocation of atleast elephant bulls for maintaining an improved genetic level.

(iv) *Creation of an International Corridor on Indo-Nepal border :*

Construction of power project at Tanappur and the creation of a reservoir has obstructed Indo-Nepal migration of the elephant and the attention of foresters, wildlifers and environmentalists is focused on the problem of creating an international corridor for migration.

Similarly large scale deforestation in Nepal has compelled the elephants of Nepal to explore alternative habitats in Dudhwa National Park and North and South Pilibhit forest divisions. During the last decade the migratory elephant population has indicated a preference for Dudhwa National Park as a preferred habitat area. Creation of an International migration Corridor on the Indo-Nepal border for the migratory population visiting Dudhwa National Park and North and South Pilibhit forest divisions is thus necessary.

Acknowledgement

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CORRIDORS

By

Bulu Imam*

In continuation of my article "Some reflections on Philip Carter's article, Mining for disaster" CHEETAL Vol. 36 Nos. 3-4, 1997 pp 8-12 and issues related to mining and corridors, I would like to further elucidate the true nature of wildlife corridors in India to-day. I also wish to explore the idea that wilderness tracts are evaluated for economic potential other than such alternatives to destructive development as eco-tourism. In North America, for example, eco-tourism is rejected from wilderness laying the way open for state protectionism and unobtrusive and surreptitious mining and logging taking over in due time. This I do not see the case in this country, where wilderness is broken up by habited and agricultural 'corridors' where a touristic potential can be exploited rather than destructive use of the wilderness for mining purposes.

There are three types of ecosystems in the world today. First, there are the wilderness areas of "wholistic ecosystems", found largely in low population continental masses such as the wilderness areas of north America, the Amazon or the Congo forests and the vast northern tracts of Russia. In places like India where the population density in what perhaps constituted similar wildernesses have risen and such "wholistic ecosystems" or wilderness areas have largely disappeared. The vast forests of Assam along the Bhutan border, connecting into the Burma hills, have been penetrated by settlers, largely an influx from outside areas. These areas have been replaced by patches or pockets of agriculture. These agricultural patches between wilderness habitats of large animals such as elephant, tiger and gaur, must not be looked at as fragmenting the ecosystem completely, but as new corridors through which those large animals may still commute from one habitat to another. Therefore, I will like to call these "connected ecosystems", because some semblance of connectedness still remains. Finally, we come to areas where industrialization has completely destroyed what was either a "wholistic ecosystem" or a "connected ecosystems" such as large mining projects and big dams, railway lines and highways, principally intended to rape that particular area ecologically for economic gain. Ancilliary developments in these areas include rehabilitation schemes in which dispossessed tribals are sought to be incorporated to an extent into the new industrialized world which has been created here. These I term as "disconnected ecosystems", since industrialization and urbanization have completely removed the farmlands and village societies which had lived with the wildlife in some degree of harmony.

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In India today we are still leaning heavily on western wildlife biologists who see farmlands in wilderness ecosystems as fragmenting the area, which they are not. And secondly, these biologists are tempted to use Paul Martin's theory of overkill to show that man has wiped out animal populations through hunting in the past and must be doing so even now. This gives way to the "poaching syndrome" phobia which does not look closer at the real facts, which include destruction of wildlife corridors still existing, leading to breakdown of genetic breeding pools. Stress is laid on lack of food for super animals due to human interference without understanding that tigers are living largely on cattle owned by the villagers in these farming corridors, which once destroyed will be gone for ever, and that large animals like elephants depend for fodder on the villagers' rice fields, and even the gaur are frequent raiders of village plantations. Once the villagers and their farming "connected ecosystems" are removed the corridors between habitats as well as the food base, as it exists today in forests of India will be wiped out forever. This has to be seen as an unpaid for largesse which the government is destroying through massive development projects like huge opencast mines and large dams, railways and highways interpenetrating and obliterating the connecting corridors between wildlife ecosystems, especially in the case of threatened species like elephants, tigers and gaur.

Recent studies have shown commensalism or relationship in which animals can live in close association with man especially to derive some benefit, neither harming or being parasitic on the other. (see Stephen Budiansky, *Covenant of the Wild*, Weidenfeld and Nicholson, London, 1994). And Cambridge biologist Colin Tudge writes in his book *The Day Before Yesterday, Five Million years of Human History* (Pimlico, London, 1996, p. 286-287), "one of the principal tasks for modern conservationist to create farms that are more hospitable to other creatures—or else make the farms more focused so that more of the wilderness is left alone." It was E.O. Wilson of Harvard who postulated over two decades back, that interconnected habitats produced more than a similar area in disconnected ecosystems, WWF proved this was so in experiments in S. America.

ECOBHAVIOURAL STUDY OF NILGAI, *BOSELAPHUS TRAGOCAMELUS* AT BERIGANGA NEAR JODHPUR (RAJASTHAN)

Sanjay Kumar Goyal and Lal Singh Rajpurohit*

Abstract

The bluebull, *Boselaphus tragocamelus* generally known as nilgai or 'rojha', is a common antelope found in the open scrubs of Rajasthan and other similar habitats in this country. This paper is the part of a study going on for last Oct./Nov., 1996 which suggests some highlights on the ecology and behaviour of the species. Nilgai prefers open forests, rangelands, open scrubs and not the dense one. They live in herds of 5-15 animals, but occasionally as solitary bulls or duos/trios. On slight disturbance, they move out temporarily into heavier cover. It is a herbivore, grazes and browses on grasses, fruits and leaves. It may not require to drink regularly but was seen drinking many times on man made ponds, lakes or natural pitches in the valleys. Because of shrinking natural foraging open scrubs and rangelands, they often take to crop raiding. They are fast runners and may run up to 60 km/hr. Nilgai are shy of humans in general, however, in this study we found few cases in which this animal charged humans. The herds of bluebull have been observed shifting from one area to other, depending upon the availability of crops, although, it is a protected wild animal under the Schedule III of the Wildlife Act 1972. But since last 8-10 years or little more as seen around Jodhpur, farmers want to get rid of this unconventional mammalian crop pest.

Introduction

Bluebull or nilgai, *Boselaphus tragocamelus* is a common antelope found in open scrubs/forests where little vegetation exists and in and around wildlife sanctuaries in Rajasthan (Roonwal, 1983). This wild animal raids the crops occasionally and is very shy of human beings (Prater, 1980 and Majupuria, 1982). Due to deforestation and increase in the area of agricultural fields disturbing ecological balance, it has become a serious pest of the crops around Jodhpur (Prakash, 1986; Rajpurohit, 1988) and complete for resource utilisation with domestic ungulates like goat. (*Capra hircus*) and Sheep (*Ovis orientalis*) (Ghosh *et al.*, 1987). It enjoys complete immunity being regarded as a near relative of the cow which is considered a sacred animal amongst the Hindus. It is a very fast moving animal which can jump easily seven to eight feet high stone wall or barbed fencing. This animal is a protected species under the Wildlife Protection Act, 1972.

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Distribution

The nilgai is exclusively indigenous and distributed from foot hills of the Himalayas in the north to Mysore in the south and Sawrastra in the west to Bihar, and parts, of Bombay. It is not found in the eastern Bengal or Assam, or any where east of this, nor in the Malabar coast of Madras (Dundar, 1982; Frank, 1929; Prater, 1980; Sanderson, 1955).

Material and Methods

Nilgai or Rojha lives in two types of units (herds) or solitary bulls. A bisexual herd has 4 to 15 individuals of both the sexes and of all age categories and the all-bull herds may comprise 2-6 adult and/or young adult male rojhas. Generally there is a single adult bull in a bisexual herd who leads the group but sometimes two or more bulls are also observed in one bisexual herd. An adult or alpha (leader) bull of one bisexual herd has been seen fighting with a solitary bull or the males (bulls) of all-bull herd for territories (Rajpurohit, 1988). This paper is a part of the study on ecology and behaviour of nilgai based on the scan and adibitum sampling (Altman, 1974) during January-July, 1997. The study site Beriganga is about 16 km. north of Jodhpur city (altitude about 241 m MSL, latitude 26°18' N and longitude 73°08' E). The climate is dry, with maximum temperature about 48°C in May/June and minimum around 0°C in December/January. Jodhpur receives 90% of its scanty rainfall (annual average 370 mm) during the monsoon in July-September. The natural open scrub vegetation is dominated by xerophytic plants including *Prosopis juliflora*, *P. cineraria*, *Acacia senegal*, *Caparis decidula* and *Euphorbia caducifolia*.

Observation

In January, 1997, two bisexual herds comprising 14 and 11 individuals and one all-bull herds having 4 bulls were observed at Beriganga in about 3.0 sq. km. area. After the arrival of monsoon in July, the bisexual herds were not found within this territory but the all bull herd having 4 bulls (on Aug. 1, 1997) and 5 bulls (on Aug. 8, 1997) was seen here at Beriganga in Central Arid Zone Research Institute (CAZRI) fencing near temple.

Nilgai is a herbivore which browses on shrubs and small trees and also grazes on grasses and herbs. In addition to this it often raids the crops jumping across 7-8 feet high stone wall or barbed fencing made to protect the crops from wild and domestic catile. It raids the fields generally in the early morning, late evenings and during night. The observations suggest that solitary bull, duo bulls or cows and a herd of about 5-15 individuals of all the age classes may forage/raid. On Jan. 12, 1997, one adult bull nilgai was found dead within CAZRI fencing but the reason could not be ascertained.

Discussion

Nilgai live in two types of units—the bisexual herds and all-bull herds. They have also been seen as solitary or in duos/trios of bull rojh. The territories and home ranges are not well defined nor defended. Although, their movements are restricted within a specified area beyond which a particular bisexual herd does not move out. But, the present study suggests the shifting of animals from one place to another depending upon the availability of food resources.

Cows nilgai were observed very aggressive when their calves were disturbed by any other species like dogs, cows, goats etc. Nilgai have the habit of resorting to the same spot to deposit their droppings. Such a rendezvous may be a means of reassembling scattered members of a herd.

Acknowledgement

The authors are grateful to Prof. S.M. Mohnot, Head, Department of Zoology, JNU University, Jodhpur for the formal facilities and encouragement. Thanks are due to the Forest Department, Govt. of Rajasthan and to CAZRI for allowing into their reserves/fencing around Beriganga (the study site) and to Mr. Pankaj Agarwal for computer work.

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FISH IN YOUR BACK YARD

By

I.S. Negi*

Introduction

THERE is more life in water than on earth and fishes constitute a major component of that. Fishes are found in oceans, seas, rivers, streams, lakes and ponds. They occupy an important place in animal kingdom. Mythologically fishes are credited with being one of the first creatures to have appeared on earth, certainly they are the oldest vertebrates. They have the capability to adapt a very wide range of physical, chemical and biotic environment from mountain streams to ocean floors. Fishes exhibit a wide range of shape, size and hues. They display a broad spectrum of colours, second to birds only.

Fish As Human Food

From time immemorial man has had a great fascination for fish. He made a detailed study of their habits, habitat, especial characteristics, anatomy and their usefulness to man. As a staple article of food fish found favour with man at a very early stage of his history. Fish constitutes a valuable part of man's food. In the event of food scarcity they make an important supplementary diet. In India a large section of population take fish. A number of products of medicinal value are derived from fish, such as, liver oil, body oil containing vitamins—A C D and E, which are particularly valuable in combating deficiency diseases. Vitamin A and D are necessary for the healthy growth of children.

Fishing Indiscriminate

Fish is found abundantly in all natural waters of hills and plains. It grows without man's efforts and he reaps the harvest which he sows not. Long long ago man devised simple weapons like spear, nets, traps to catch the fish. In olden days man fished only for his need and not for his greed. Since the fishes are prolific breeder, there was plenty of fish for every one. In the plains fishing is done with the help of net, which is a traditional method and is harmless. Moreover, fishing carried out with net does not hamper the sustained growth of fish. But in hills fishing is done by net, trap, diversion of channels and of late with the help of dynamite. Fishing by diverting water in hill streams, locally called 'oon' was granted as a concession to hill people in the forest settlement at the time of reservation of forests. This evil practice is still in vogue in some parts of Garhwal and Kumaun. In 'oon' water of a hill stream is diverted to the side lane over a length of 200-300

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meters and the stream is completely dried in that portion. Fish in the dried part of the stream get exposed and are then collected wholesale. The worst of all is dynamiting the rivers for fish. After Independence a host of construction activities came up in the hills and the explosive meant for construction of dams and roads passed into the hands of unscrupulous people, who used it for killing fish. Dynamiting the rivers has completely destroyed the fish killing big, small, fingerlings and eggs.

In hills where fishing cannot be controlled and regulated due to inaccessibility, considerable damage has been done to fishes. 'Dhunars, a traditional fishing community in the hills have been catching fish with net from very old times. Fishing has been main-stay of their life. But in recent times when the hill rivers and streams have become incredibly deficient in fish 'Dhunars' find it extremely difficult to make their livelihood. They have taken to other occupations.

Pisciculture

After the Independence the subject of fisheries known as pisciculture was promoted on a substantial basis, as a result of which fish production did increase. Yet in India the consumption of fish per capita remained 1.52 kg. per annum, which is lowest in the world. This average is for the plains. But in hills a large chunk of population do not or cannot eat fish for even once a year. Therefore, the need for fish culture is nowhere so pressing as in hills. The government has done precious little to promote fishery in hills but given the will, quite a lot can be done by the people themselves.

In inland fisheries estuarine, riverine and pond culture can be practised. The former two are cumbersome and costly and come under the purview of the government. For individuals only pond culture is recommended.

Pond Culture

Culture of certain types of fishes in wells, domestic tanks or garden ponds is an old practice in India. In Bengal and Bihar rearing of fish for daily consumption has been in vogue for many many years. It is now spread to other states and is wide-spread in Uttar Pradesh. Elsewhere also fishery can be practised as part of kitchen garden. For rearing fish in kitchen garden a kutchra tank of any size and shape can be made. A common size is 8' × 6' × 5'. The depth of water in the tank should be kept 4' throughout the year. Marshy places are preferable as they retain water better than dry places. Approximately one quintal of cow dung may be heaped at one corner of the tank, for the development of worms. It should be done 15 to 20 days before the actual inoculation is done, i.e. fingerlings are introduced in the pond. The young ones of fish, usually 4.25 cm. long, can be collected from natural ponds and streams and transferred to tank/pond prepared for the purpose. Fingerlings are also supplied by the state fisheries department under the pisciculture promotion programme.

Fingerlings are put in June-July at the rate of 2000 fingerlings per acre area. For a small pond of the size mentioned above, 200 fingerlings will be sufficient. Fingerlings feed on grass, algae and worms, that naturally grow in the pond. But for proper development of the fingerlings rice bran, oil cake, wheat or millet flour and kitchen refuse are to be fed to them. The pond will have to be covered with wire mesh to avoid possible damage by cats, jaikals or pine martin. For better aeration, the top 6" water of the tank should be drained out every week and replaced by fresh water. In case the pond is lacking in water weeds, then some grass is to be put in the pond for helping the fish in breeding. Fish starts breeding after one and a half year.

Choice of Species

Though a large number of fish can be cultivated in ponds but carp would be the most likely choice, because its flesh is tender and nutritious. Carps are popular as food fishes. Most of the carps are plankton feeders and two or three species can be grown together in one pond. *Labeo rohita* (Rohu), *Labeo calbasu*, *Labeo fimbriatus*, *Cirrhina mrigal*, *Cyprinus carpio* (common carp) are all suitable for pond culture.

Yield

If every thing goes well fish are available for table after one year when the individual fish weighs 500 to 600 grams. After making due consideration for casualties, 200 fingerling originally inoculated give rise to 100 fish of 500-600 grams each.

Profitable Proposition

Fishery (Fish rearing) is a profitable proposition. From a small tank you can get 50 kg of fish in a year and get a 500-600 grams fish for your kitchen twice a week. If fishery is practised on a larger scale it can prove to be a good source for supplementing family income, but in that case the size of the pond will have to be increased as per requirement.

Age of Fishes

There are varied opinions about the age of fishes. But Pisciculturists generally agree that fishes live long. Carps are said to be of incredible age. According to most modest estimates carp may live for 100 years and one or two of the patriarchs are accredited with no less than four hundred years.

And why only fish, the snakes are also believed to live for more than thousand years. But this seems more a guesstimate than a scientific estimate.

STATUS SURVEY OF BUTTERFLY FAUNA IN AND AROUND JAIPUR CITY

M.M. Trigunyat*

Introduction

Indian sub-continent has nearly 1430 species of Butterflies which together with sub species number about 2500, distributed among 10 families viz.—Papilionidae, Pieridae, Danaidae, Satyridae, Amathusiidae, Nymphalidae (Talbot, 1939). Data for, 'rare' and 'very rare' categories are available (Talbot, 1939, Varshney 1986) from each of these families (Table 1). Data revealed that nearly 520 species, sub species and races have already become 'rare' or 'very rare'. Survey conducted by Zoological Survey of India (ZSI) have revealed that a substantial number of large and beautiful butterflies particularly from Papilionidae and Nymphalidae families in and around Shillong and adjoining areas, NE India. Western Himalayas Western Ghats etc. are not as common as they were reported earlier. Among variety of factors, the habitat destruction by deforestation, urbanisation, industrialisation, agriculturisation, over collection for scientific studies and commercial exploitation are the principal reasons (Khosoo, 1983, 86).

Jaipur, the state capital of Rajasthan, situated amidst Aravali hill ranges, is expanding to accommodate the higher influx of human population. Reports on Butterfly fauna (Trigunayat and Singh, 1997) are available but no reports on the "status" of butterflies of this region are available. The present study, therefore, was undertaken and revealed the presence of 51 species belonging to 26 genera of 7 families (Table 3).

Materials and Methods

Identification was done using Evans (1932), Talbot (1939), Wynterblyth (1957), in the light of revised nomenclature (Varshney, 1980; 85).

Study Area

The study was carried out at several localities in and around Jaipur city. Ram Niwas Garden, Sisodia Garden, Vidhyadhar Garden and University Campus were the localities studied inside the city, whereas Kookas dam area, Nahargarh reserve forest, Ramgarh sanctuary and the premises of Durgapura agricultural research centre were the outside localities. The observations were recorded from Feb., 1995 onwards.

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Table 1

Total number of rare and very rare species of butterflies from the Indian Region

Family	Total No. Species/sub species	No. of rare species	No. of Very rare species
Papilionidae	217	23	18
Pieridae	182	26	7
Danaidae	77	7	3
Satyridae	335	71	18
Nymphalidae	430	92	45
Lycaenidae	650	132	49
Hesperiidae	480	12	82
Amathusiidae	55	14	3
Acraeidae	4	—	—

Based on (Talbot 1939, Varshney, 1986)

Table 2

Number of rare and very rare species of butterflies from Peninsular India only

Family	Status	No. of species	Total
Papilionidae	R	1	3
	VR	2	
Pieridae	R	8	8
	VR	—	
Danaidae	R	3	4
	VR	1	
Satyridae	R	5	5
	VR	—	
Nymphalidae	R	13	14
	VR	1	
Lycaenidae	R	20	23
	VR	3	
Hesperiidae	R	61	69
	VR	8	

Based on (Khosoo, 1983)

Table 3

Status of butterflies of Jaipur region

S. No.	Family	Genus	Species	Common Name	Status
1.	Danaidae	Danaus	<i>Danaus plexippus</i> (Linn)	Common tiger	VC
			(<i>Danaus genutia</i> (Kramer)		
			<i>Danaus chrysippus</i> (Linn)	Plain tiger	VC
			<i>Danaus limniace</i> Cramer		C
			(<i>Danaus limniace leopardus</i> (Butler)	Blue Tiger	C
			<i>Danaus aglea</i> (Stoll)	The Glassy tiger	C
			<i>Euploea</i>		
		Euploea	<i>Euploea core</i> Cramer	Common Indian crow	VC
			<i>Melanitis leda</i> (Drury)	Common evening brown	C
2.	Satyridae	Melanitis	(<i>Melanitis leda ismene</i> (Cramer)		C
3.	Nymphalidae	Euthalia	<i>Euthalia garuda</i> (Moore)	Baron	N
		Hypolimnias	<i>Hypolimnias misippus</i> (Linn)	Danaid eggfly	F
			<i>Hypolimnias bolina</i> (Linn)	The great eggfly	C
		Argynnis	<i>Argynnis hyperbius</i> (Johnssen)		
		Precis		The Indian Fritillary	C
			<i>Precis almana</i> (Linn)	Peacock pansy	C
			<i>Precis hierta</i> Fabr	Yellow pansy	C
			<i>Precis lemonias</i> (Linn)	Lemmon pansy	C
			<i>Precis orithyia</i> (Linn)	Blue pansy	C
		Vanessa	<i>Vanessa cardui</i> (Linn)	The painted lady	N, M
		Atella	<i>Atella phalantha</i> (Drury)	Common leopard	
4.	Papilionidae	Papilio	<i>Papilio polytes</i> Linn	The Common mormon	VC
			(<i>Papilio polytes romulus</i> Cramer)		
			<i>Papilio machaon</i> Linn	the Common yellow swallow tail	C
			<i>Papilio demolus demoleus</i> Linn	the Lime butterfly	

	Polydorus	<i>Polydorus hector</i> (Linn)	The Crimson rose	C
	(Atrophaneura)	(<i>Atrophaneura hector</i>)		
		<i>Atrophaneura aristolochia</i>	The Common rose	C
	Pathysa	<i>Pathysa nomius</i> (Esper)	The Spot sword tail R, M (?)	
	(Graphium)	(<i>Graphium nomius</i> (Esper)		
5. Pieridae	Pieris	<i>Pieris brassicae</i> (Linn.)	The Large cabbage white	C
		(<i>Pieris brassicae nepalensis</i>)		
		Doubleday		
	Leptosia	<i>Leptosia nina</i> Fabr.	The Psyche	C
	Colotis	<i>Colotis etrida</i> (Boisduval)	The Little orange tip	C
		<i>Colotis eucharis</i> (Fabr)	The Plain orange tip	C
		<i>Colotis danae</i> (Fabr)	The Crimson tip	VC
		<i>Colotis vestalis</i> (Butler)	The White arab	VC
		<i>Colotis fausta</i> (Olivier)	The Large salmon arab	C
		<i>Colotis amata</i>	The Small salmon arab	
		<i>Colias croceus</i> (Fourcroy)		
	Colias	(<i>Colias electro fieldi</i>)	Dark clouded yellow	C
	Ixias	<i>Ixias marianne</i> (Cramer)	The White orange tip	C
		<i>Ixias pyrene</i> (Linnaeus)	The Yellow orange tip	VC
	Catopsilia	<i>Catopsilia crocale</i> (Cramer)	The Common emmigrant	VC
		<i>Catopsilia crocale pomana</i> (Fabr)	The Lemmon emmigrant	VC
		<i>Catopsilia pyrenthe</i> (Linn)	The Mottled emmigrant	VC
	Terias	<i>Terias libythea</i> (Fabr)	Small Grass yellow	VC
	(Eurema)	(<i>Eurema brigitta rubella</i> (Wallace)	The Spot less grass yellow	C
		<i>Terias hecabe</i>	The Common grass yellow	
		(<i>Eurema hecabe</i>)		
		<i>Terias laeta</i> Boisduval	The Spot less grass yellow	
		(<i>Eurema laeta leata</i> (Boisduval)		
6. Lycaenidae	Azanus	<i>Azanus jesous</i> (Guerin)	The African babul blue	C
		(<i>Syntarcus jesous gamra</i> (Lederer)	The Dull babul blue	C
		<i>Azanus uramus</i> Butler	The Bright babul blue	C
		<i>Azanus ubaldus</i> (Cramer)		

Euchrysops	<i>Euchrysops pandava</i> Horsefield	The Plains cupid	C
	(<i>Euchrysops parrhianus minuta</i> Evans)		C
Apharitis	<i>Apharitis cecama</i>	The Tawny silver line	C
Zizeeria	<i>Zizeeria trochilus</i>	Grass Jewel	C
	(<i>Freyeria trochilus putli</i> (Kollar)		
	<i>Zizeeria lysimon</i>	The Dark grass blue	VC
	(<i>Zizeeria knysna karsandra</i> (Moore)		
	<i>Zizeeria gaika</i>	The Tiny grass blue	VC
	(<i>Zizula gaika</i> (Trimen)		
7. Hesperidae	<i>Zizeeria otis</i>	The Lesser grass blue	VC
	Udaspus		
	<i>Udaspus folus</i> (Cramer)	The Grass demon	N
	Taractocera		
	<i>Taractocera maevius</i> (Fabr.)	The Common grass dart	N
	Baoris		
(Parnara)	<i>Baoris guttatus</i> (Bremer and Grey)		C
	(<i>Parnara naso-bada</i> (Moore)	Straight swift	N

Revised names are given in Paranthess

Status C—Common; VC Very Common; N—Not Common; M—Migrant; F—Fairly Common, R—Rare.

Results

Seven families were recorded from the study area. Status of these families from the Peninsular India is represented (Table 2). Majority of the species from the said families were common (C) to very common (VC). *V. cardui*, was not very common. It might probably be a migrant as it was seen occasionally. None of the species from Hesperidae were very common.

Discussion

A species is called 'threatened' when there is evident reduction in its numbers. The status of 'rare' and 'very rare' is according to its abundance in a specified area. Presently there are about 350 species included in the Red Data Book and other such records listed from this region (Varshney, 1986). At the localities studied in the present study none of the species were rare (VR). *Pathysa nomius nomius* (Esper) (family-Papilionidae) was not recorded during the present study. It, however, was reported earlier (Devarshi and Trigunayat, 1992) *Euthalia garuda* was not common (N). It was recorded from the nursery in the University campus only. Hesperidae were rarely seen. Crepuscular habit of this group might probably be attributed for this rarity as the study hardly coincided at dawns and dusks. Habitat destruction is generally being experienced everywhere which is an

outcome of deforestation (for urbanisation and industrialization). Since butterflies exhibit specific host plant interactions (Wynterblyth, 1957; Talbot, 1939) therefore, loss of any host plant species from the area concerned might also threaten the existence of a particular species of butterfly in that area. Since no earlier records of the species on this aspect are available hence decline in species abundance or their threatened or endangered status cannot be advocated. The present information, however, shall serve a baseline record.

Pieridae, Nymphalidae, Lycaenidae and Danaidae were designated common to very common as compared to Papilionidae, Hesperidae and Satyridae. Only single species was recorded from Satyridae which was common during September-October months (Additions to the list of this family cannot be ruled out).

Acknowledgements

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DESTRUCTION OF MAHSEER IN HILL STREAMS

by S. Gurkirat Singh Mann

Very large amounts of money is spent in other countries of the world in stocking rivers with fry of sporting fish, but alas ! here in our country, where rivers naturally contain the mahseer, next only to the salmon in sport and value, we cannot preserve what nature itself has planted in our rivers, leave alone adding fry at fabulous cost.

Due to lack of control and due to utter ignorance of villagers and local fishermen, the mahseer is so shamelessly exploited that the species will soon be exterminated and one would soon have to go to an aquarium to see a mahseer. What else can happen when even spawning waters are bombed or blasted, poisoned or diverted and fish are collected, after drying the beds of streams where they spawn and where the little ones were to grow, thus ending their life cycle.

To give an illustration, if people think fish to be a commodity which is naturally to be used as food by the population, but at the same time it is not protected and efforts at propagation are not made, then what would happen to it ? When even agricultural produce cannot keep pace with the needs of the population, inspite of all resources and efforts of the Government, then how can fish remain or multiply in face of no Government effort and of mass exploitation ?

In the Doon Valley the devil's own contrivances are used to destroy fish. These are used not to catch fish for sport or for the pot but for wholesale destruction. Some of these methods, I mention below.

In the Aglar nadi at Senji, below Mussoorie, a large number of locals gather with the first heavy showers in July for what is known as the 'Machi ka Mela !' When fish come up laden with eggs to spawn, nature forcing them to go into these small streams to deposit their offspring which could not have survived in big rivers, where they would have been eaten up by other fish, tortoises etc., the locals collect a type of weed which they burn into ashes and throw into the water. These ashes are deadly poison for fish and their spawn. In a few minutes hundreds of big and small fish float dead in the water: some of these the locals take home and the rest are carried away by the stream to utter destruction.

This is the first attack on fish-breeding. Then come dead-lines, night-lines, traps, nets and explosives. Whatever is left over of later migrations of fish is destroyed by the villagers in these mountain streams when the water goes down by erecting barriers of thorn and wood, through which the fish cannot pass to go down to the main rivers after breeding. They are then easily killed with stones and sticks and even guns, or by drying and diverting the water.

This happens in varying degree in all hill streams and when whatever is left of the fish come down into the lower rivers, these are disposed off by villagers and others with explosives, small-mesh nets etc. through which the smallest fish cannot pass.

There does not appear to be any law that applies to the stretches of streams which are outside the reserved forests. These streams are controlled by the Gram Panchayats who lease them out to contractors for fishing. It is not known if these contractors are under any restrictions as regards size of mesh for their nets, season of fishing etc. Where there are special fisheries departments, as in Himachal Pradesh and the Punjab, there is control in these matters and special staff to prevent fishing without permits and to control illegal practises, fishing in the close season etc. A friend of mine recently visited the Giri river, near Solan, and found fishing guards on both banks of this river, one in H.P. and the other in Punjab territory, which passes through non-reserve areas at this point. Presumably the Gram Panchayats were functioning here as well, yet persons were fishing with rod and line under the control of the fisheries department. There is a similar department in the U.P., yet they do not appear to have any control over similar areas in that State and the result is wholesale destruction of fish in waters outside the reserved forests.

To prevent the above, the U.P. Government should protect the fish of the rivers, as in the Punjab, as a national possession. Even if under the new Gram Panchayat system the villagers have the right to the fish in rivers which pass through their areas, surely the fishing should be done with due regard to close seasons and rational methods, which will ensure the perpetuation of stock. Further, stretches of the rivers should be preserved for rod and line fishing only, for sportsmen and tourists, and if any local fishing associations or societies wish to protect rivers and conserve and increase fish stocks through their own efforts, they should be encouraged to do so.

Bombing, poisoning and netting are cognizable offences and deterrent punishment is awarded to law breakers. The civil, police and forest staff should be empowered to intercept offenders under rules of suitable fishing legislation and especially under the Explosives Act as regards bombing of rivers. But in spite of all this such illegal activities are going on unabated.

At present the situation as regards fishing and fish-destruction, in the sub montane tracts of the U.P., is a typical instance of 'nobody's business' except in the waters passing through the reserved forests, where there is some semblance of control through the forest department. For instance, it was heartening to find on my recent visit to the Song river at Satya Narain that a member of the staff of wildlife organisation of the forest department had hauled up several unauthorized people netting fish in the reserve area. If this interest could be kept up and extended by the Government to the non-reserve areas, there are good hopes of fish propagation.

MORNINGSIDE DECLARATION 1998

Sri S.S. Bist, IFS, Conservator of Forests, West Bengal, an eminent forester and wildlife expert had the privilege of participating in the 3rd 'Environmental Leaders' forum hosted by the centre for Environmental Research and Conservation (CERC) of Columbia University at New York from 8th to 16th May, 1998. The focus of the forum this year was on 'Human-Wildlife conflict. The forum came out with a declaration titled 'MORNINGSIDE DECLARATION-1998, addressed to individuals, organisations and Governments calling for measures to mitigate human-wildlife conflict. The same is being produced here.

—Editor

Preamble :

Wildlife is a key global resource and basic to the health of ecosystems everywhere. Yet all over the world, we see increasing human-wildlife conflict. This escalation is the result of many causes, including: degradation and fragmentation of ecosystems; growing human populations; inadequate scientific understanding of the issue; political indifference; meager financial resources; poor communication among researchers, resource managers, and policy makers; and local markets distorted by pressures of the global economy. The international community must recognize that human-wildlife conflict is one of the greatest threats to the survival of wildlife over the long term and must be resolved as a matter of absolute urgency.

We, the members of the 1998 delegation of the Environmental Leaders Forum, a worldwide network of environmentally concerned citizens in academia, government and organizations of civil society, wish to address the international community to draw their attention to the critical problem of the loss of biological diversity through unresolved human-wildlife conflict, and to suggest measures to mitigate this conflict at three levels: international, national, and individual.

Declaration:

International

Considering that the human-wildlife conflict is closely related with the depletion of biodiversity, which has become a global concern, the cross-boundary impacts of economic development among nations and foreign investments must take into account the prevention of human-wildlife conflicts.

1. We urge ecologically responsible direct foreign investment so as not to exacerbate human-wildlife conflict. We call upon the high consuming nations to invest in ecologically sustainable enterprises that result in the conservation of nature.
2. We call on international organizations to promote economic development paradigms that reduce economic disparities among nations, foster ecologically responsible policies and lessen human-wildlife conflict.
3. We urge the international community to encourage and promote research, training, and exchange of information at the national, regional and international level about the ecological, socio-economic, legal, and managerial aspects of human-wildlife conflicts.

National

Every nation has the sovereign responsibility to save its own wildlife and devise the strategies to achieve this goal. These strategies should integrate national and regional development and conservation so as not to exacerbate human-wildlife conflicts.

1. We urge nations to develop land use and spatial planning policies that are compatible with wildlife conservation, especially in areas where humans and wildlife are likely to come into contact.
2. We urge national level policies that promote social and economic justice. Effective democracy is important to conservation, because local people are then more inclined to accept wildlife conservation measures as beneficial to themselves.
3. We urge measures to eradicate poverty through development activities that are both ecologically, socially and economically responsible, as well as remunerative to local communities.
4. We urge nations to put in place effective, rapid, and equitable measures and mitigation programmes to provide relief to people who suffer losses through damage caused by wildlife.
5. We urge nations to enhance and increase support for formal and non-formal education, research, and professional training for managing human-wildlife conflict that is mutually informed by economics and ecology.
6. Recognizing the often overlooked effectiveness of indigenous peoples' traditional knowledge for compatible coexistence with wildlife, we urge nations to identify, nurture, and make effective use of such values, beliefs, and practices among the local communities as may ensure conservation of natural resources and reduce conflict with wild animals.
7. We call on national wildlife departments to involve local communities in a meaningful way in the management of human-wildlife conflicts.

8. We call on nations to review, amend, and update existing laws and policies to facilitate implementation of strategies for resolution of human-wildlife conflicts.

Individual

Individuals, whether acting as members of a group or on their own, have the responsibility to educate themselves and future generations about the survival status of their natural heritage.

1. We call on individuals to behave responsibly toward wildlife on social, political and economic levels.
2. We encourage individuals to organize to devise locally appropriate solutions to conflicts that threaten wildlife survival and human lives and livelihoods.
3. We urge individuals to accept their own responsibility to act to minimize human-wildlife conflict and participate actively and meaningfully in reducing conflicts.

In the service of these recommendations, we, the members of the 1998 delegation of the Environmental Leaders Forum, commit ourselves to actions to prevent, mitigate, and respond to human-wildlife conflicts, for the benefit of both people and wildlife. We call upon other Forum participants, citizens, governments, NGOs, academia, local communities and the international community to join us in a broad-based dialogue to strengthen all our abilities to face our common challenge.

Signed on May 15, 1998 at the Center for Environmental Research and Conservation at Columbia University in the City of New York, U.S.A.:

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SOME FACTS ABOUT BIRDS

THERE are 8600 living species of birds in this world, belonging to 27 natural orders, out of which 21 orders are found in India.

OWLS feed mostly on field mice. An owl, on an average can kill 10,000 mice over an acre land in a year. Owls have sharp vision and can see even in one hundredth of light intensity normally required by human beings for seeing.

OSTRICH (*Struthio camelus*) is the largest living bird. It is 2.5 metre high and weighs about 135 kg. It has 25,000 feathers. It can run at a speed of 40 m p.h. with a pace upto 14 feet.

HUMMING BIRDS are the smallest birds in the world. Among them little wood star (*Acestrura bombus*) is 6.5 cm long and weighs just 2.5 grams. They have only 900 feathers. They can move their wings at a speed of upto 70 beats per second.

CROWS are the most intelligent of all birds. They also have remarkable memory. They are famous for their wariness and sagacity and are quick to sense the impending danger and evade it. There is only one living creature that habitually gets the better of the house crow, the KOEL, whose life history is based on the assumption that it can at will circumvent and deceive the crow and this it does by substituting its own eggs for those of the crow.

AFRICAN CROWNED EAGLE (*Stephanoaetus coronatus*) known as Harpy are extremely powerful birds, capable of killing monkeys, sloths and even deer. A Harpy weighing only 4 kg can kill an antelope weighing around 20 kg.

PIED CRESTED CUCKOOS and common Hawk—CUCKOOS, both lay their eggs in babblers' nest while the owners are away. The babblers serve the CUCKOOS as foster parents for rearing their young ones. It is impossible to distinguish between the Pied crested CUCKOOS' eggs deposited amongst a clutch of jungle babblers' eggs as both are apparently identical in size, shape and glossy blue shells.

Compiled by I. S. Negi

KNOW YOUR WILDLIFE

TAHR (*Memitragus jemlahicus*) : The Himalayan Tahr, generally called mountain goat, is found throughout the Himalayas from Pir Panjal to Sikkim and Bhutan.

HABITAT : The mountain goat prefers steep rocky mountain faces between altitude of 8000-10000 feet, though never found above the tree line i.e.; 12000 feet. Their favourite habitat is a precipitous terrain of towering rocks and dense scrub and forest. They like shade and shelter which gives them additional protection. At these heights herds of tahr can be seen perched on a pinnacle in seemingly inaccessible ground. The more difficult and precipitous the terrain the better it is pleased.

HABIT : Tahr lives in herds. During winter they crowd into the bottom of the valleys but not far away from difficult ground. When snow melts in March-April they ascend to higher and more unattainable retreats. Tahr has a wide range of diet, comprising grass, leaves, twigs, bark, roots, tubers, pods, nuts, drupes, berries etc.

GENERAL CHARACTERS: Tahr has a heavy body, long robust limbs and finely formed head. Body is covered with long coarse hairs. In the neck and shoulders it grows a mane which sweeps down to knees. The colouring is very variable, generally it is deep reddish brown. Old males are darker. Ewes and young males are lighter brown. Kids are paler.

Height of the male at shoulders is 36-40 inches, weight is approximately 95 kg. Horns are 12-15 inches long. Record horns are 16.5 inches. Females are smaller in built with horns seldom exceeding 10 inches.

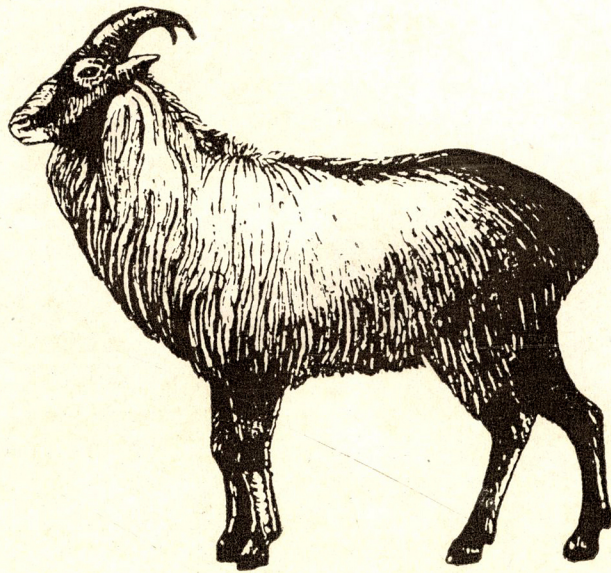
In the late summer the old males live away from the herd. They rejoin the females late in autumn. Rutting takes place in winter. The males fight savagely for the possession of female. In combat some time one of the contestants crash down the rock. Many are killed in this way.

The young ones are born in May-June. Generally one kid is born at a time. No off spring is produced as a result of tahr crossing a domestic goat. The flesh of tahr is red in colour and is much relished by local people.

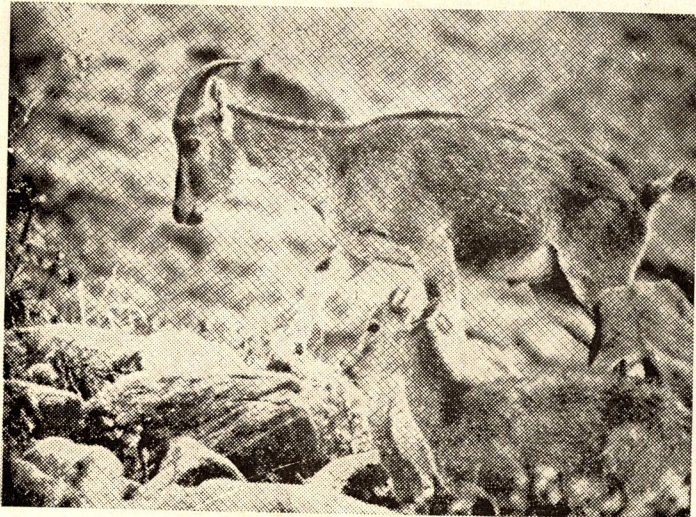
PRESENT STATUS : Rare and included in Schedule I of Indian Wildlife (Protection) Act.

REMARK : Tahr is an unwary animal. It would not run away merely on hearing a sound, even a gunshot, unless it sights a man or a predator, when the dominant male gives a warning shriek asking all others to run away. The leader would leave the ground in the last, when every other member of the herd has fled. In this gesture of chivalry it often gets shot down by crazy gun men.

Tahr enjoys a significant position in the folk-lore of Garhwal and Kumaun.



Tahr



Nilgiri Tahr—(Photo : E.R.C. Davidar)



A magnificent Bharal—*(Photo by Hari Dang)*



Female Bharal — *(Photo by Girish Kumar)*

BHARAL (*Pseudois nayaur*) : Commonly called a blue sheep due to its slaty grey coat with thin blue stripes on its body. Genetically it is midway between sheep and goat, characteristically more akin to goat. In fact bharal is a mixture of goat and sheep. But the bharal will not cross with domestic sheep nor it is easy to tame a bharal.

DISTRIBUTION : Though originally from Tibet, bharals are found all over Himalayas in Ladakh, Garhwal, Kumaon, Nepal, Sikkim and Bhutan.

HABITAT : They generally dwell in high mountains, between tree and snow line where there is rich and abundant grass. They avoid forest and bushes. In summer they go upto 16000 feet and in winter climb down to 12000 feet.

HABIT : The bharal is a wary animal and difficult to detect on the blue shale rocky slopes, which it frequents. Its sense of sight and smell are both keenly developed. In summer they live in flocks of 10 to 20 even 50, but sometimes they form large groups of 150 to 200. They feed in the morning and evening on grasses, herbs, hardy herbacious plants, lichen and mosses on open slopes.

GENERAL CHARACTERS : Bharals are sturdy animals. They have short, narrow legs. They are alert and agile and can run up and down on steep rocky terrain with remarkable ease. A well grown male bharal is 3 feet high at the shoulders and weighs 55 to 70 kg. Horns are smooth curving backward and upwards at the tips. Horns are 23-24 inches long, record head measured 33.25 inches in Tibet. In female the horns measure upto 10 inches. General colour is brownish grey, suffused with slaty blue, browner in summer and more distinctly slaty grey in winter.

rutting takes place in September-October. The young ones are born in February-March. In spring and summer the old rams seek higher levels and rejoin females in September when rutting season commences

PRESENT STATUS : Rare and included in Schedule I of Indian Wildlife (Protection) Act.

REMARKS : Bharal has a massive head with long curved horns. It takes advantage of its head in helping young ones and weak females of the herd to climb the precipices. The male rests its head against the vertical cliff and the young ones take first jump on to the head of the male, making it a stepping-stone and then take the second jump on to the flat ground over the cliff. The male either finally jumps over the cliff or takes a detour for joining the herd.

काला तेंदुआ — दुर्लभ प्राणी

रामेश वेदी

1978 के शुरू के महीनों में दिल्ली में एक सरकस आया था। इसके इश्टिहारों में सरकस का मुख्य आकर्षण 'ब्लैक टाइगर' बताया जाता था। धुआंधार इश्टिहारबाजी में सरकस कम्पनी पहली बार 'ब्लैक टाइगर' के करतब देखने के लिये दर्शकों को आमंत्रित करती थी। हिन्दी और अंग्रेजी दोनों भाषाओं के विज्ञापनों में इस विलक्षण प्राणी को 'ब्लैक टाइगर' लिखा जाता था जिसका अर्थ 'काला शेर' है। मैं काले शेर के अस्तित्व के बारे में बिल्कुल अनभिज्ञ था। एक जिज्ञासु के रूप में मैं सरकस कम्पनी के नए अवम्भे 'ब्लैक टाइगर' को देखने के लिये गया। पिंजरे में से निकालकर जब रिंग में 'ब्लैक टाइगर' को लाया गया तब मैंने हैरानी से देखा कि वह काला तेंदुआ है, शेर नहीं। इससे यह तो जाहिर था कि जन-साधारण को इस दुर्लभ प्राणी के बारे में बिल्कुल जानकारी नहीं है। वरना महीनों तक जनता को पहली बार 'ब्लैक टाइगर' दिखाने का धोखा नहीं दिया जा सकता था।

काला तेंदुआ एक दुर्लभ जीव है। 1958 की मार्च में मैंने एक बार इसे कौबेट नेशनल पार्क में देखा था। शाम चार बजे मैं ढिकाला से रामनगर आ रहा था। उस दिन मुझे जंगल में एक ठेकेदार के ठेले पर लिफ्ट मिल गई थी। पार्क में वन्य-जीवन इतना बहुतायत में है कि अनायास ही अनेक जानवर दीख पड़ते हैं। शाम का समय भी ऐसा था कि जंगल में जीवों की चहल-पहल बढ़ गई थी। मन्थर गति से बढ़ते हुए हमारे ठेले की खड़क-फड़क आवाज को सुनकर ये जीव साल वन के ऊंचे पेड़ों की कतार के किनारे ही खड़े हो जाते थे और जब तक हमारा खटारा आगे न निकल जाता, वे एकटक हमें घूरते रहते थे। भारी-भरकम सींगों वाले मस्त साम्भर और शाखादार सींगों वाले चीतल थोड़ी-थोड़ी दूरी पर खड़े जैसे हमारा स्वागत कर रहे थे। साल वन की उस ठण्डी सड़क पर हमारे ठेले ने कोई पाँच किलोमीटर की दूरी तय की होगी कि हमें कुछ ही कदमों पर सड़क को पार करता हुआ काला तेंदुआ नजर आया। मैंने झट ठेला रुकवा लिया। तेंदुआ भी जंगल में गायब नहीं हुआ। वह जानता था कि इस पार्क में जानवरों को मारना मना है। दो-चार छलांगे भरकर सड़क के नजदीक ही नितम्बों को टेककर हमारी हरकतों पर गौर करने लगा। जानवरों को देखने की सुविधा के लिए मैं खाली ठेले के अन्दर कैमरा लिये खड़ा था। आपस में सलाह करके मैं और गेम वार्डन नीचे उतरे। उसकी ओर हमने कुछ कदम बढ़ाए ही थे कि वह छलांग मारता हुआ घने जंगल में गायब हो गया। इस उदाहरण में मैंने काले तेंदुए को मस्त, गम्भीर और निडर जानवर पाया। उत्तर भारत में काला तेंदुआ कम मिलता है। सिक्किम, असम, नीलगिरि व मालाबार के वनों में तथा मलय प्रायद्वीप में अपेक्षाकृत अधिक पाया जाता है। इन प्रदेशों में वर्षा अधिक होती

है और सदाबहार घने जंगल होते हैं। काले तेंदुए अधिकतर एशिया में पाए जाते हैं। अफ्रीका में भी इनके मिलने के रिकॉर्ड हैं।

काले तेंदुए का सारा शरीर काला होता है। सूर्य की किरणें जब तिरछी पड़ रही होती हैं तब उसकी काली खाल के अन्दर काले रंग के चकत्ते या निशान दिखाई पड़ जाते हैं जो हूबहू सामान्य तेंदुए के निशानों जैसे होते हैं।

काला तेंदुआ प्रकृति की विलक्षणता है। यह अलग जाति (स्पीसीज) नहीं है। प्रकृति में और चिड़ियाघरों में एक ही ब्यात के बच्चों में, काले और सामान्य रंग के बच्चे पैदा होने के उदाहरण मिल जाते हैं। इसलिए काले तेंदुए को अलग नस्ल (रेस) का जानवर भी नहीं माना जाता है।

भुवनेश्वर के नन्दन कानन बायोलॉजिकल पार्क में 15 मार्च, 1974 को एक नर काले तेंदुए के साथ सामान्य रंग की मादा तेंदुआ रखी गई। उसी साल 13 दिसम्बर से 20 दिसम्बर तक, (आठ दिन तक) मादा गरमी में आ गई। इस जोड़े में देखा गया कि अधिकतर मादा रतिविलास के लिये पहल करती थी। सम्भोग से ठीक पहले लेटी हुई मादा उठती थी, मन्द स्वर में विशेष प्रकार की गुर र् .. गुर र् .. जैसा शोर करती थी और कुछ बोलती थी। तब वह आराम करते हुए काले नर के पास जाती थी और अपने बाहरी उत्पादक अंगों तथा शरीर को उसके साथ रगड़ती थी जब तक नर उठ न जाए वह बार-बार ऐसा करके उसमें कामदेव को जागृत करती थी।

नर उठकर चारों ओर नजर फेरता था। पेट के बल लेटी मादा के ऊपर चढ़ने को तैयार होता था। नर की अगली दोनों टांगें मादा की दोनों बगलों के साथ होती थीं। अब तक दोनों की पूंछें नीचे होती थी। मादा बेचैनी से अपनी देह की स्थिति को इस तरह बदलती थी कि उसके बाहरी प्रजनन अंग नर के प्रजनन अंग के समीप आ जाएं। प्रजनन अंगों का सम्पर्क होने की सुविधा के लिए नर और मादा दोनों अपनी पूंछ उठा लेते थे।

छह बार के पर्यवेक्षण में देखा गया कि वास्तविक मैथुन 38 से 58 सेकेण्ड तक होता था। उस समय मादा की पूंछ एक बाजू में रहती थी। मैथुन करते समय नर अपनी गरदन आगे तान लेता था। मादा की गरदन की ढीली खाल को तब तक भलीभांति पकड़े रखता था जब तक घर्षण से मैथुन पूरा न हो जाये। मैथुन के चरम-उत्कर्ष के समय नर एक विशेष प्रकार की मद्धम आवाज करता था जो सम्भवतः क्षरण शुरू होने के परम सुख की अभिव्यक्ति होती थी।

क्षरण के अन्त में मादा गरजती हुई नर की तरफ होती थी। उसके साथ ही मादा के ऊपर से कूदकर नर एक नरफ हो जाता था। थकी हुई मादा पीठ के बल शिथिल लेट जाती थी। अगली बार सम्भोग करने तक नर उससे अलग थकान उतारने लेट जाता था।

जोड़ा बनाने के दिनों में बीच के दो दिनों की अवधि में सम्भोग की बारम्बारता अधिक थी। इस अवधि में दो सम्भोगों के बीच का समय कई बार लगभग दस मिनट से भी कम होता था। भोजन के समय यह जोड़ा सम्भोग में अधिक दिलचस्पी नहीं लेता था।

न्यूयार्क जुओलोजिकल पार्क में काले तेंदुए के एक जोड़े से एक ब्यात में एक ही बच्चा पैदा हुआ था। नवजात बच्चे की लम्बाई 35 सेंटीमीटर थी और वजन 560 ग्राम। सामान्य रंग के तेंदुओं के साथ 14 नवजात बच्चों की लम्बाई 45 सेंटीमीटर थी। जिसमें पूंछ की 15.1 सेंटीमीटर औसत लम्बाई शामिल थी। इनका औसत वजन 518 ग्राम था।

अठारह अक्टूबर, 1972 को असम सरकार के गुलाहाटी चिड़ियाघर से एक वयस्क काला नर तेंदुआ उड़ीसा के नन्दन कानन वायोजोजिकल पार्क में लाया गया। उसने सामान्य रंग की दो मादाओं के साथ जोड़ा बनाया। मादाओं का नाम स्पोटी और रूपा था। ये दोनों उड़ीसा के फूलबनी जिले के जंगलों से पकड़ी गई थीं।

स्पोटी ने 23 जुलाई, 1973 को तीन बच्चों को जन्म दिया। इनका रंग अपनी मां जैसा था। रूपा ने 2 अगस्त 1973 को दो काले बच्चों को जन्म दिया। इनमें से एक नर और एक मादा थी। इन काले बच्चों में धब्बे यद्यपि अदृश्य थे लेकिन वयस्क काले तेंदुओं के समान इनमें भी अच्छे प्रकाश में गौर से देखने पर नजर आते थे। जन्म के समय काले बच्चों का वजन 587 ग्राम और 550 ग्राम था। पूंछ समेत इनकी लम्बाई 43 सेंटीमीटर और 44 सेंटीमीटर थी। पूंछ 15 सेंटीमीटर लम्बी थी।

साधारण रंग के नवजात बच्चों का औसत भार 603 ग्राम था और औसत लम्बाई 45 सेंटीमीटर थी। मां बड़ी सतर्कता से तीनों बच्चों को पाल रही थी। सातवें सप्ताह के बाद बच्चे मां के साथ गौमांस खाने लगे थे। तीन महीने की उम्र तक इनका वजन निम्नलिखित तरीके से बढ़ता रहा :

तिथि	काला नर किलोग्राम	काली मादा किलोग्राम	सामान्य नर किलोग्राम
2 अगस्त 1973 (जन्म के समय)	0.587	0.550	0.603
9 अगस्त 1973	0.857	0.910	1.065
16 अगस्त 1973	0.980	1.223	1.410
23 अगस्त 1973	1.250	1.500	1.720
30 अगस्त 1973	1.400	1.700	1.856
6 सितम्बर 1973	1.600	1.800	2.000
13 सितम्बर 1973	2.000	2.000	2.400
20 सितम्बर 1973	2.400	2.300	2.700
27 सितम्बर 1973	2.500	2.400	2.800
4 अक्टूबर 1973	2.600	2.700	3.500
18 अक्टूबर 1973	3.400	3.700	4.000
25 अक्टूबर 1973	3.900	4.100	4.400
1 नवम्बर 1973	4.400	4.600	4.800

इन्हें पालने वालों ने यह गौर किया कि सामान्य रंग के बच्चों से काले रंग के बच्चे अधिक धूर्त और बदमिजाज थे।

बारह अक्तूबर, 1933 को जूरिच के चिड़ियाघर से एक काला तेंदुआ भाग गया। अगली सुबह लोगों ने अखबार में यह समाचार पढ़ा। उनमें वेचैनी फैल गई। बिल्ली वंश के बड़े प्राणियों में काला तेंदुआ सबसे अधिक खतरनाक होता है। बंदीगृह में यह कितने ही बरस क्यों न रह ले, पालतूपन के जरा भी चिन्ह नहीं दिखाता।

इस तेंदुए ने किसी को जखमी नहीं किया था। वास्तव में यह एकदम लापता हो गया था। कुछ लोग बताते थे कि उन्होंने दूर से उसकी एक झांकी देखी है। परन्तु इनमें से किसी भी दावे की तसदीक नहीं की जा सकी। कुछ लोगों का दावा था कि उन्होंने इसकी पगली देखी है। लेकिन ये बड़े कुत्तों के पैरों के निशान साबित हुए। भागने के दस सप्ताह बाद वह मिल गया। दूर पहाड़ पर एक खेत में खलिहान के फर्श के नीचे वह सौ रहा था। जिस आदमी ने उसे देखा वह नहीं जानता था कि वह कौन-सा जानवर है। आहार के लिए कोई बढ़िया चीज की आशा से उसने उसे शूट कर दिया था। भागे हुए तेंदुए का किस्सा इस तरह यकायक खत्म हो गया। इसमें एक रोचक प्रश्न उठ खड़ा हुआ। गरम जलवायु में रहने वाले एक जंगली विडालीय जन्तु स्विस पर्वतों में पतझड़ के मौसम में डेढ़ महीने तक कैसे जिन्दा रहा? उसे अपनी गुजर करने में कोई कठिनाई नहीं हुई। लाश की परीक्षा करने पर उसकी सेहत अत्युत्तम दिखाई दी। इन सप्ताहों में वह कहां घूमता रहा और क्या खाता रहा—इसका कुछ पता नहीं चला।

सफेद रंग के तेंदुए अत्यन्त दुर्लभ प्राणी हैं। हजारीबाग में एक सफेद तेंदुआ मिला था। जिसका नमूना ब्रिटिश म्यूजियम में रखा है।

दोगली सन्तान

कोल्हापुर चिड़ियाघर में बड़े आकार के एक तेंदुए और सिंहनी के समागम से जो सन्तान हुई थी उसमें दो बच्चे पैदा हुए थे। उनमें एक लगभग ढाई महीने का होकर मर गया था। दूसरा पूरा बढ़ गया था। मरे हुए बच्चे की खाल का फोटो बम्बई नेचुरल हिस्ट्री सोसायटी के जर्नल में अप्रैल 1913 के अंक में पृष्ठ 187 पर छपा था। इसके ऊपर तेंदुए के समान चटाक थे। हमारे देश के जंगली तेंदुए से इसमें फर्क यह था कि इसकी देह के बाजुओं पर चटाक अधिक छोटे और घने थे। इनका रंग भी भूरा था और ये इतने स्पष्ट भी नहीं थे। ऐसा लगता था कि ये उसी तरह उम्र बढ़ने के साथ-साथ फीके पड़ते हुए लुप्त हो रहे थे जैसे कि सिंहों में हुआ करता है। सिर, मेरुदण्ड से नीचे, पेट और टांगों पर चटाक बिलकुल काले व साफ थे। पूंछ का निचला भाग धारीदार था और सिरा काले रंग का तथा अधिक लम्बे बालों से ढका हुआ था। बाजुओं के नीचे तेंदुए में जो उजली सफेदी होती है वह यहां मैली सफेदी में बदल गई थी, यह विशेषता इसे मां से मिली थी। इसके कान पीले-भूरे रंग के थे जिनके ऊपर एक चौड़ी काली पट्टी थी। तेंदुओं के कानों पर जो सफेद दाग होता है वह इसमें नहीं था।

इस संकर को देखकर चिकागो के संकर का स्मरण हो आता है। वह उदाहरण तो इससे भी अधिक दिलचस्प था। इसमें मादा पहले ही कच्छ-तेंदुए (जैगुआर) और तेंदुए की वर्णसंकर सन्तान थी। उसकी

सिंह से सन्तति प्राप्त की गई थी। फील्ड के 18 और 25 अप्रैल तथा नौ मई, 1908 के अंकों में इसके विवरण छपे थे। एक अखबारी समाचार के अनुसार ग्लासगो में इसे एक सिंह ने मार दिया था। यह सिंह साथ के पिंजरे में रखा हुआ था। उसने बीच के पार्टीशन को तोड़कर झटपट उसका काम तमाम कर दिया था।

जाज पसन्द है

लन्दन के चिड़ियाघर में बांसुरी, वायलिन और जाज बजाकर विभिन्न जानवरों पर उनके प्रभाव का अध्ययन किया गया। यह देखा गया है कि तेंदुआ जाज की आवाज को पसन्द करता है बर्नुम के सरकस में एक तेंदुआ था जो एक विशेष स्वर बजाने पर खुशी से नाच उठता था।

दिल्ली चिड़ियाघर में तेंदुओं और काले तेंदुओं को एक साथ रखा गया है। ये आपस में खूब खेलते हैं और मित्रभाव से रहते हैं। बाड़े में खुले दौड़े हुए या घूमते हुए सिंह, शेर और चीते तो दर्शकों में कोई दिलचस्पी नहीं दिखाते परन्तु मैंने देखा है कि जब हम तेंदुओं के पास फोटो खींचने जाते हैं तब ये हमला करते हैं। भौंहें चढ़ाकर दांत दिखाते हैं और जाल के बड़े छिद्रों में से टांग निकालकर पंजे से चोट करते हैं। इसके अलावा जंगले के बाहर जब कोई शरारती लड़का तेंदुए को खिजाने के लिए दौड़ लगाता है तब वह भी उसके साथ दौड़ने लगता है।

प्रजनन क्रिया

एक ब्यात में मादा तेंदुआ दो से चार बच्चों को जन्म देती है। कदाचित् इनकी संख्या पांच तक भी पहुंच जाती है। साल के किसी भी समय बच्चे पैदा हो सकते हैं। 13 से 15 सप्ताह तक ये मां के पेट में रहते हैं। इस विषय में कुछ पता नहीं कि प्रकृति में एक ब्यात से दूसरे ब्यात के बीच कितना अन्तर होता है, परन्तु चिड़ियाघरों में देखा गया है कि एक साल के व्यवधान के बाद फिर बच्चे पैदा हो जाते हैं। साल में दो बार नवम्बर और मार्च के महीनों में इन्हें जोड़ा बनाते देखा गया है। संवेशन की अवधि, जोड़े बनाने का तरीका आदि बातों में यह शेर के समान ही है। एक दिन सुबह आठ बजे से शाम साढ़े छह बजे तक एक युगल ने 82 बार जोड़ा बनाया था। जंगल में बच्चों को एकदम गोपनीय स्थानों में छिपाया जाता है।

बड़ी ममता से मां अपने बच्चों का पालन करती है। दिल्ली चिड़ियाघर में मैंने माता बनी हुई दो तेंदुआ मादाओं के स्वभाव में बेहद अन्तर देखा। रानी नामक एक मादा ने 1963 की मई के दूसरे सप्ताह में दो बच्चों को जन्म दिया था। पालक के आदेशों को यह विनीत भाव से पालन कर लेती थी और बिना विरोध प्रकट किए अपने साथ सिमटकर बैठे हुए बच्चों को छोड़कर बगल वाले कठघरे में चली जाती थी। प्रसवगृह में इसके बच्चों को उठाकर बाहर निकालना आसान काम था। यह इतनी सीधी थी कि इसकी मौजूदगी में भी पालक बच्चों को छूने की हिम्मत कर सकता था। चिड़ियाघर की यह लोकप्रिय रानी एक साल पहले एक बार चिड़ियाघर से भाग चुकी थी जिसके कारण यहां के अधिकारी इससे सशंकित रहते थे। दो दिन की सरगर्म तलाश के बाद यह हुमायूं के मकबरे में मिली थी। जब तक इसका पता न चला था चिड़ियाघर और पास की बस्ती सुन्दर नगर में बँचेनी फैली रही थी। लेकिन बाद में इसने अधिकारियों को शिकायत का मौका नहीं दिया था।

खालों की तस्करी

संरक्षण के बावजूद चोर-शिकारी इसे मध्य प्रदेश के सतना, शिवपुरी, बिलासपुर और कौन्ती क्षेत्रों में; उत्तर प्रदेश के पीलीभीत, नैनीताल और अलमोड़ा क्षेत्रों में; हिमाचल प्रदेश के कुल्लू और कांगड़ा क्षेत्रों में; राजस्थान के अलवर और अजमेर क्षेत्रों में खाल के लिए निर्दयता से मार रहे हैं। इस चोर-व्यापार में बनवरिया, कंजर, खटीक और डफर जाति के लोग लगे रहते हैं। बनवरियों और खटिकों के जिम्मे तेंदुओं का शिकार करना और उनकी खालों को जंगल से निकालना होता है। वे खालों को कंजरों और डफरों के हाथ बेच देते हैं। इनकी माली हालत बनवरियों और खटिकों से कुछ बेहतर है। ये खालों को कमाते हैं और जम्मू-कश्मीर में फर के दुकानदारों को बेच देते हैं। भलीभांति कमाई हुई तेंदुए की खाल की कीमत 1976 में 4,000 रुपये के आसपास थी। इस अवैध व्यापार में शिकारी को 500 रुपये मिल जाते थे।

उपलब्ध जानकारी के अनुसार 1974 में खालों को कमाने का सिलसिला दिल्ली के सदर बाजार की गली गिआरियां में और दस्ती खटिकान में स्थापित था। परन्तु सख्ती से कानून लागू करने पर यह कारोबार आगरा चला गया। वहां ढोलिया खाट बस्ती खाल के व्यापारियों का स्वर्ग बन गई। यहां से सभी खालें जम्मू-कश्मीर भेज दी जाती थीं।

दिल्ली में अधिकतर विदेशी टूरिस्ट तेंदुए की खालों के ग्राहक थे। अनुमान है कि 1973 में अकेले दिल्ली शहर में नवम्बर-दिसम्बर के महीनों में 3,000 खालें बिकी थीं। 1974 में कुल 1,500 खालों की बिक्री हुई। 1975 में यह संख्या 60-70 ही रह गई।

अवैध व्यापार को रोकने के लिए सख्त कदम उठाने से ही यह गिरावट आई। 25 नवम्बर, 1975 को एक छापे में दिल्ली प्रशासन के वाइल्ड लाइफ स्टाफ ने तेंदुए की 30 खालें पकड़ी थीं। ये एक बोरे में बन्द थीं जिस पर कलकत्ता से दिल्ली लिखा था। छापे मारने का लाभ यह हुआ कि तेंदुए तथा विडाल वंश के अन्य जानवरों का चोर-शिकार करीब 90 प्रतिशत कम हो गया। काले बाजार में खालों की कीमतें गिर गईं। शेर की कच्ची खाल की कीमत 500 रुपये और तेंदुए की 700 रुपये रह गई।

जुलाई 1976 में, मैं कश्मीर और लेह के दौरे पर गया था। श्रीनगर में तेंदुए की तथा विडाल वंश के जानवरों की खालें खुलेआम बिक रही थीं। वहां सैकड़ों आदमी इस व्यापार में लगे थे। फरों की कई शानदार दुकानें थीं। लेह में भी फर की एक दुकान खुल गई थी, जिसमें मैंने तेंदुए और शेर की खाल के कोट देखे थे।

मार्च 1980 में उदयपुर (राजस्थान) के पास एक गांव में तीन आदमियों को गिरफ्तार किया गया। इनके ऊपर एक तेंदुए को मारने का आरोप था। छानबीन से पता चला कि इस गिरोह के आपराधिक कुकृत्यों की जड़ें बहुत गहरी थीं। पिछले एक महीने में दो तेंदुए मरे हुए मिले थे। सन्देह था कि यह इस गिरोह की

ही करतूत थी। दोनों नर तेंदुए थे। इनमें से एक की खाल उदयपुर के वाइल्ड लाइफ स्टाफ ने इस गिरोह से बरामद कर ली थी।

उन्हीं दिनों उदयपुर के एक सदी पुराने चिड़ियाघर से एक मादा तेंदुआ-सुन्दरी रहस्यपूर्ण ढंग से गायब हो गई थी। वह जिस बाड़े में रहती थी उसकी छत काटकर खोली हुई पाई गई थी। इस काम में भी गिरोह के हाथ का शक किया जाता था। अनुमान है कि बाड़े से मुक्त होने के बाद वह जंगल में अभी अधिक दूर नहीं गई होगी, तभी गिरोह ने उसे मार लिया होगा। बताया जाता है कि इस गिरोह के पीछे सुसंगठित कारोबारी थे जो खालों को विदेशी मार्केटों में ऊँचे दाम पर बेच देते थे।

आठ अक्टूबर, 1978 को मारे गए छापे में खालों के तस्कर व्यापारियों के एक गिरोह के पास तेंदुए की छह परिष्कृत खालें बरामद की गई थीं। मुकदमे में अपराध की पुष्टि हो गई। गिरोह के सरगना बाबूलाल को और उसके दो बेटों, सोहनलाल तथा दीनदयाल को तीन साल का कठोर कारावास दिया गया, साथ ही दो-दो हजार रुपए जुमनि का दण्ड दिया गया। इनके नौकर को सात महीने की कठोर जेल और पाँच सो रुपए का दण्ड दिया गया।

दिल्ली में मजनु का टीला (तिब्बती कैम्प) के नजदीक 1993 के शुरू अगस्त में बड़ी तादाद में अवैध धन्धे की हड्डियां और खालें बरामद की थीं। इसमें तेंदुए की 43 खालें थीं। फिर 20 सितम्बर, 1993 को यहाँ से तेंदुए की 16 खालें तथा तेंदुए और शेर की 200 किलोग्राम के आसपास हड्डियां बरामद की गई थीं। 24 जनवरी, 1994 को दिल्ली पुलिस की अपराध शाखा ने तेंदुए की दो खालें बरामद की थीं। इस मामले में गिरफ्तार दोनों अभियुक्त जबील अहमद अंसारी और फारु खान पुरानी दिल्ली में रहते थे। 22 नवम्बर, 1994 को दो तेंदुए की खालें विदेशी ग्राहकों को बेचते समय पकड़ी गई। इनकी तस्करी करने के आरोप में दो व्यक्तियों प्रेमलाल और नाजिर हुसैन को गिरफ्तार किया गया था। प्रेमलाल दिल्ली का ही रहने वाला था। उसे इसी अवैध धन्धे में 1974 और 1978 में भी पकड़ा गया था। 1974 में उसे सजा हुई थी, 1978 में वह बरी हो गया था। उसके दो बेटे भी वन्य जीवों की हत्याओं के आरोप में पकड़े जा चुके थे। प्रेमलाल के अनुसार तेंदुए की खालें आमतौर पर जम्मू-कश्मीर भेज दी जाती थीं जिनसे कोट, पर्स और हैण्ड बैग आदि बनाए जाते थे। तैयार चीजों को पाकिस्तान के रास्ते अरब देशों में निर्यात कर दिया जाता था।

तेंदुए की खालों और हड्डियों की तस्करो के धन्धे में बड़े मुनाफे को देखकर नजीबाबाद (जिला बिजनौर, उत्तर प्रदेश) का एक वकील अजय कुमार गुप्त भी इसमें लिप्त हो गया। उसने स्थानीय जंगल की जनजातियों के एक आदमी से नजीबाबाद में 55,000 रुपए में तेंदुए की छह खालें और तीन किलोग्राम हड्डियां खरीदी। अक्टूबर में अजय कुमार को एक विदेशी ग्राहक मिल गया। उसे बेचने के लिए वह दिल्ली आ गया। दस लाख रुपए में सौदा तय हुआ था। अन्तराष्ट्रीय बाजार में तेंदुए की इन छह खालों और तीन किलोग्राम हड्डियों

की कीमत 15 लाख रुपए आंकी गई थी। दस दिसम्बर, 1994 को शिवाजी स्टेडियम के नजदीक अजय कुमार उस विदेशी ग्राहक का इन्तजार कर रहा था। उसे सौंपने से पहले ही पुलिस ने अजय कुमार को गिरफ्तार कर उसके कब्जे से खालें और हड्डियां बरामद कर लीं।

हिमाचल प्रदेश में भी खाल के लिए तेंदुए चोरी-छिपे मारे जा रहे हैं। उनकी खालें दिल्ली में बेची जाती हैं। हिमाचल प्रदेश के परवानू में रहने वाले 27 वर्षीय सन्दीप गुप्ता पेशे से प्रीपर्टी डीलर हैं। वह तेंदुए की खालों की अवैध बिक्री के धन्धे में कमाई करने की जुगाड़ में था। उसने परवानू के एक किसान से 20,000 रुपए में पांच खालें खरीदी। उन्हें लेकर वह दिल्ली आया और ग्राहक की तलाश करने लगा।

उसने हरेक खाल की कीमत एक लाख रुपए लगाई थी। सब खालों की हालत बहुत बढ़िया थी, उनकी लम्बाई 2.25 मीटर थी। अन्तर्राष्ट्रीय बाजार में एक खाल की कीमत पांच लाख रुपए से अधिक कूती गई थी। पहाड़गंज में इम्पीरियल सिनेमा हॉल के बाहर सन्दीप गुप्ता को 11 जनवरी, 1995 को पुलिस ने गिरफ्तार कर लिया और उसके कब्जे से तेंदुए की पांचों खालें बरामद कर लीं। पूछताछ से पता चला था कि हिमाचल प्रदेश के ऊंचे इलाकों में किसान बहुधा तेंदुओं का शिकार करते हैं। वे खाल उतारकर बाकी शरीर को जमीन में गाड़ देते हैं।

पालम क्षेत्र में दो युवकों को तेंदुए की तीन खालों के साथ 17 जनवरी, 1996 को गिरफ्तार किया गया था। तीन खालों में से दो खालों पर गोली के निशान थे। एक खाल पर नाखून भी सही-सलामत थे। गुड़गांव के एक व्यापारी ने इन युवकों को खालें बेचने के लिए दी थीं। ये युवक पालम क्षेत्र की एक फर्म में नौकरी करते थे। जांच पुलिस का खयाल था कि संभवतः रणथम्भोर (राजस्थान) के जंगलों में इन तेंदुओं को शूट किया गया था। मारने वालों के गिरोह में सुरक्षा बल का एक सिपाही भी शामिल था।

ये थीं कुछ घटनाएं जिनमें लुक-छिपकर, लोगों की निगाहों से दूर, तेंदुए की खालें बेचने की कोशिश की जा रही थीं। लेकिन राजधानी के दिल की धड़कनों पर भी तस्करी का धन्धा करने का तस्कर साहस कर लेते हैं। 30 जून, 1995 को पालिका बाजार में 25 साल का युवक अनिल कुमार तेंदुए की खाल बेचने की कोशिश करते हुए पकड़ा गया था। उसके झोले में खाल भरी थी। पूछताछ करने पर उसने बताया कि वह तेंदुए की पांच खालें लाया था, जिनमें से चार उत्तम नगर बस स्टॉप के पास बेच दीं। उपलब्ध जानकारी के आधार पर ये तेंदुए मध्य प्रदेश के राजगढ़ और उड़ीसा में मारे गए थे।

तेंदुए का भाग्य पोचरों को गोली से लिखा जा रहा है

1989 में की गई गणना में हिमाचल प्रदेश में 540 तेंदुए थे। 1993 में इनकी संख्या 820 हो गई। विश्वास किया जाता है कि 1995 में, प्रदेश में 1,000 से अधिक तेंदुए हो गए थे।

तेंदुओं की संख्या में सबसे अधिक वृद्धि कांगड़ा जिले के पालमपुर में बताई गई थी। 1989 में वहां केवल 15 तेंदुए थे और 1993 में 89 हो गए। बिलासपुर और जोगेन्दर नगर क्षेत्रों में तेंदुओं की संख्या क्रमशः 15 से 47 और 64 से 133 हो गई थी।

प्रदेश के वन, वन्यप्राणियों के संरक्षकों की मान्यता थी कि इनके प्राकृतिक आवास और शिकार में बहुत कमी हो जाने से ये आहार की तलाश में गांवों और शहरों की ओर रुख करने के लिए बाध्य हो गए थे। पालतू पशुओं को तो मारते ही थे, भूख से व्याकुल होने पर इन्सान को भी नहीं छोड़ते।

तेंदुआ संरक्षित प्राणी है। उसे मारना कानूनी अपराध को करने वाले पर पच्चीस हजार रुपए जुर्माना करने का और सात साल के कारावास का दण्ड देने का प्रावधान है।

तेंदुओं द्वारा मनुष्यों को मारने की घटनाएं हिमाचल प्रदेश में बढ़ती गई। प्रभावित लोगों के आश्रितों को मुआवजा देने की राशि में भी वृद्धि होती गई। जिन परिवारों के प्रियजन असमय ही तेंदुओं द्वारा अचानक छीन लिए गए उनमें तेंदुओं के प्रति असन्तोष पनपता गया। इन्सान के इस खतरनाक दुश्मन से निजात पाने के लिए उन्होंने लाचारी में उन्हें चोरी-छिपे मारना शुरू किया। साथ ही, सरकार से रक्षा के लिए गुहार की।

1995 में हिमाचल प्रदेश के तत्कालीन मुख्य वन संरक्षक श्री ज्ञानचन्द्र गुप्त ने केन्द्रीय पर्यावरण एवं वन मन्त्रालय से 270 तेंदुओं को मारने की औपचारिक प्रार्थना की थी। उनकी दलील थी कि प्रदेश के मौजूदा जंगलों में तेंदुओं की बढ़ती हुई संख्या की समाई नहीं हो सकती। उन्होंने बताया था कि इस पहाड़ी राज्य के निचले क्षेत्रों में 1993 की गणना में 513 तेंदुए गिने गए थे, लेकिन वहां के जंगलों में कुल 245 तेंदुए समा सकते थे।

इण्टरनेशनल यूनियन फॉर कन्जर्वेशन ऑफ नेचर एण्ड नेचुरल रिसोर्सेज के विडाल विशेषज्ञों (cat specialist group) ने इस पर तीव्र प्रतिक्रिया दिखाई तथा हिमाचल प्रदेश के वन विभाग के दृष्टिकोण से असहमति जतलाते हुए कहा कि तेंदुओं की वास्तविक संख्या को कोई नहीं जानता और विश्वसनीय जानकारी प्राप्त करने के लिए व्यापक सर्वेक्षण करना जरूरी है।

पर्यावरण और वन मन्त्रालय ने भी हिमाचल प्रदेश में चुने हुए अनवांछित तेंदुओं को मारने की अनुमति देने से इन्कार कर दिया, और वाइल्ड लाइफ इंस्टिट्यूट ऑफ इण्डिया (देहरादून) को तेंदुए की समस्या को अध्ययन करने और उससे निपटने के उपायों की सिफारिश करने के लिए कहा।

प्रदेश में तेंदुओं का उपद्रव बढ़ता गया और उनसे सताए लोगों में भी रोष अधिक फैलता गया। प्रदेश की आम जनता को संरक्षण प्रदान करने का अपना उत्तरदायित्व निभाने के लिए वन विभाग ने हत्यारे तेंदुओं को नरभक्षी घोषित कर उन्हें मरवाने की मुहिम जारी रखी।

वन्य जीवों के कुछ संरक्षकों का उपद्रवी तेंदुओं से निपटने की इस मुहिम के लिए समर्थन नहीं प्राप्त हुआ। उनका मत है कि इसमें कुछ निर्दोष तेंदुए भी अज्ञानवश मारे जा रहे हैं और, इसकी आड़ में तेंदुए

की कीमती खाल के लोभी पोचरों का अवैध धन्धा पनप रहा है। उनका कहना है कि कुल्लू, मनाली, धर्मशाला जैसे दूरिस्टों की गहमागहमी वाले स्थानों में तेंदुए की खालें खुलेआम बिक रही हैं। फूलते-फलते इस अवैध व्यापार को रोकने के लिए हिमाचल प्रदेश में अधिक मुस्तैदी से कार्यवाही करने की जरूरत है।

वर्ल्ड वाइड फंड (भारत) के एक खण्ड ट्रैफिक इण्डिया ने तस्करों के कब्जे से बरामद किए गए शेर और तेंदुए के शारीरिक पदार्थों का विवरण संकलित किया है। उसके अनुसार वन्य जीवों के अवैध व्यापार में पोचरों द्वारा यदि एक शेर मारा जाता है तो पांच तेंदुए मारे जाते हैं। जुलाई 1993 से दिसम्बर 1994 की अवधि में शेर के तो लगभग 55 शारीरिक अवयव बरामद किए गए और तेंदुए की 265 खालें बरामद की गईं।

उड़ीसा में व्यापक रूप से चोर-शिकार किया जाता है। आर्डर देने पर तेंदुए की खालें और दूसरे वन्य प्राणियों के शरीर के अवयव मिल जाते हैं। उड़ीसा में बेची जाने वाली खालों की प्रत्येक खेप में एक सौ खालें होती हैं। अप्रैल 1995 में उड़ीसा के खुर्दा जिले के एक छोटे से गांव पिचकोली में तेंदुए की पूरी तरह कमाई हुई 20 खालें बरामद की गई थीं जो बिक्री के लिए पेश की गई थीं।

पश्चिम बंगाल के दार्जिलिंग जिले में दिसम्बर 1994 में तेंदुए की 87 खालें पकड़ी गई थीं और शेर की केवल एक।

ट्रैफिक इण्डिया का विवरण केवल बरामद की गई चीजों पर आधारित है। यह विवरण चोर-शिकार के पूरे आंकड़े नहीं बताता।

यह खूबसूरत चित्रित विडाल पोचरों द्वारा भारत में सभी जगह निष्ठुरता से मारा जा रहा है। यह मानकर भी कि भारत ने शेरों की संख्या से तेंदुओं की संख्या दुगुनी है, तेंदुओं का पांचगुने की दर से चोर-शिकार चौका देने वाली बात है। तेंदुए का भाग्य अब पोचरों की गोली से लिखा जा रहा है।

भारतीय तेंदुए की संख्या जिस रफ्तार से कम हो रही है उसे देखकर आघात पहुंचता है। वन्य जीवों के संरक्षक सौचने लगे हैं कि यह शेर से भी अधिक व्यापन्न स्थिति में पहुँच रहा है। वे अनुभव करते हैं कि इसे भी शेर और गैन्डे के समान संरक्षण मिलने की जरूरत है तभी इस खूबसूरत प्राणी को बचाया जा सकेगा।

शहरी-वानिकी

शैलेन्द्र कुमार सिंह*

शहरी-वानिकी भारत के संदर्भ में बहुत लोकप्रिय शब्द नहीं हैं, परन्तु इसके महत्व को नकारा भी नहीं जा सकता। वृक्षों का महत्व और उनकी जरूरत विश्व के अनेक भागों में अनादि काल से मानव की सभ्यता में शामिल रही हैं। भारत, मिस्र, ग्रीक, चीन और रोम में वृक्षों को देवता तुल्य समझा जाता था और उनकी पूजा होती थी। इतिहास बतलाता है कि वृक्षारोपण तकनीकी 1500 बी०सी० पूर्व मिस्रवासियों के पास थी और वे पेड़ों को एक जगह से दूसरी जगह स्थापित करने में सक्षम थे। थियोफरेस्टस और प्लिनी ने पेड़ों के रख-रखाव के क्षेत्र में इस ज्ञान को और आगे बढ़ाया।

आरम्भ में मानव ने जब व्यापार के लिए एक देश से दूसरे देश की यात्राएं शुरू कीं, तो उसे जो पेड़-पौधे अच्छे लगे, उनके बीज और पौधे भी अपने साथ लाया। इस तरह पौधों का भी स्थानान्तरण शुरू हुआ और साथ ही इनसे जुड़ा हुआ ज्ञान। वैसे 'आरबोरिस्ट' शब्द का सर्वप्रथम उल्लेख जेम्स लिटे द्वारा लिखी किताब 'डोडेन' में मिलता है (1578)। इसी तरह सन् 1618 में विलियम लांसन द्वारा लिखित किताब 'एन्यू आर्चंड एण्ड गार्डन' में वृक्षों की जानकारी और उनके रख-रखाव की विस्तृत जानकारी मिलती है। पेड़ों के बारे में वृहद् जानकारी जान इलवन ने भी सन् 1662 में अपनी पुस्तक 'सिल्वे' में दी है। बीसवीं सदी में वनविद्या और आगे बढ़ी। सदी के अन्त में जानदवे जिन्हें आधुनिक वनविद्या का जनक कहा जाता है, ने सन् 1924 में 'इण्टरनेशनल शेड ट्री कान्फरेंस' की स्थापना की। वर्तमान में इसका नाम 'इण्टरनेशनल सोसाइटी ऑफ आर-बोरिकलचर' है। शहरी वानिकी की संकल्पना और प्रबन्धन व्यवहारिक रूप में वास्तव में सन् 1960 के बाद ही अस्तित्व में आया। अगर शहरी वानिकी को परिभाषित किया जाए तो कुछ इस तरह होगा :—

“शहरी वानिकी वनविद्या की वह विशेष शाखा है, जिसके अन्तर्गत पेड़ों के उगने और उनके प्रबन्धन का अध्ययन किया जाता है। इसका मुख्य उद्देश्य शहरवासियों की मानसिक, सामाजिक एवं आर्थिक जरूरतों को पूरा करना है”।

शहरी-वानिकी की जरूरत—

आज विश्व की जनसंख्या 5.3 बिलियन से ऊपर है और वर्तमान में भारत की जनसंख्या 950 मिलियन से ज्यादा है। शहरीकरण आजादी के बाद बहुत द्रुतगति से बढ़ा है। जहां सन् 1901 में सिर्फ 11 प्रतिशत आबादी शहरों में रहती थी वहीं सन् 1981 में 23 प्रतिशत आबादी शहरों में रहने आयी। सन् 1971-81 के मध्य तक भारत में 15.7 मिलियन जनसंख्या गांवों से शहरों की तरफ आयी और शहर से गांव जाने वाली जनसंख्या केवल 6.4 मिलियन रही, जिससे शहरों की आबादी में कुल 9.3 मिलियन लोगों की वृद्धि हुई। आज भारत में 24 से ज्यादा ऐसे शहर हैं, जिसकी जनसंख्या एक मिलियन से अधिक है, इनमें 12 महानगर शामिल हैं,

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जैसे कलकत्ता, मुम्बई, दिल्ली, चेन्नई, बेंगलोर, हैदराबाद, अहमदाबाद, कानपुर, पुणे, नागपुर, लखनऊ तथा जयपुर। शहरों की बढ़ती आबादी का मुख्य कारण इनसे जुड़े उद्योग-धंधे और सुख-सुविधाएं रही हैं, परन्तु अनियोजित औद्योगीकरण और गांवों से शहरों की तरफ जनसंख्या का अनियंत्रित पलायन ने अनेक जटिल समस्याओं को जन्म दिया है—

आवास की समस्या :— आज भारत के शहर न सिर्फ समानान्तरण दृष्टि से फैल रहे हैं अपितु लम्बवतरूप से भी बढ़ रहे हैं। शहरों में बहुमंजिला इमारतों की उपस्थिति और उनका निर्माण अनिवार्यता नहीं परन्तु विवशता है। जगह की कमी के कारण अब कोई विकल्प रहा ही नहीं है। वैसे भी हर शहर हर साल अपने चारों तरफ फैलता जा रहा है। दिल्ली अब गाजियाबाद और गुडगांव तक फैला हुआ है। शोपड़-झुगी अब शहरों के आवश्यक अंग बन गये हैं, जहां शुद्ध पीने का पानी, बिजली और स्वच्छ वातावरण दुर्लभ चीज है, फिर भी लोग वहां रहने के लिए मजबूर हैं।

मृदा प्रदूषण :— अधिकांश शहरों में मलभूत्र की निकासी की समस्या गम्भीर है। अधिकतर कूड़ा-करकट शहर के बाहर या अन्दर खुला छोड़ दिया जाता है, जो अपने आप अनेक बीमारियों को खुला निमंत्रण है। पिछले सालों में सूरत शहर में प्लेग और दिल्ली में डेंगू बुखार शहरों की गन्दगी से ही सीधा सम्बन्ध रखते हैं।

भारत में अब भी बहुत बड़ी जनसंख्या शीच के लिए खुले स्थानों का उपयोग करती है। शहरों में रेलवे-स्टेशनों के आसपास के स्थानों को शीच के लिए इस्तेमाल किया जाता है। इस मामले में हमें चीन से सबक लेना चाहिए, जहाँ रात्रि-मृदा घरेलू उपयोग के लिए बायोगैस में उपयोग होता है और बचा हुआ कम्पोस्ट कृषि के लिए खेतों में काम आया है। परन्तु हमारे यहाँ—सामाजिक मान्यताओं की वजह से यह व्यवहारिक नहीं हो पा रहा है। जनता शौचालय के रूप में सुलभ शौचालय एक नया विकल्प सामने आया है परन्तु इससे सारी समस्याएं हल हो जायेगी ऐसा लगता नहीं है।

ध्वनि प्रदूषण— ध्वनि प्रदूषण आधुनिक शहरों का अपरिहार्य अंग बन गया है। शहरों में इसके मुख्य स्रोत वाहन, औद्योगिक इकाइयां, विज्ञापन, भाषण, जागरण, समारोह और निजी घरों में टी०वी०, रेडियो, कूलर, कपड़े धोने की मशीन इत्यादि हैं। इनमें से वाहन और औद्योगिक इकाइयां प्रमुख हैं। ध्वनि प्रदूषण में रहने से सुनने की शक्ति क्षीण होती है, साथ ही अशान्ति, अनिद्रा, क्रोध, उच्चरक्तचाप जैसी व्याधि पकड़ लेती है।

वायु प्रदूषण— महानगरों में वायु प्रदूषण की समस्या सर्वविदित है। सन् 1984 की 2 दिसम्बर की रात को हुये भोपाल गैस कांड को लोग अभी भी नहीं भूले हैं, जिसमें 2,400 से ज्यादा आदमी और असंख्य मवेशियों की जान चली गई थी। आज बारह साल बाद भी लोग उस त्रासदी से उबर नहीं पाए हैं।

वायु प्रदूषण के मुख्य स्रोत औद्योगिक इकाई और वाहन हैं। आजादी के बाद अपने देश में वाहनों की संख्या तीव्र गति से बढ़ी है और शहरी वातावरण को सबसे ज्यादा नुकसान इन्हीं वाहनों से हुआ है। वायु में सल्फरडाइ आक्साइड, कार्बन डाइआक्साइड, हाइड्रोकार्बन की वजह से बीमारियां होती हैं। जैसे आँख, नाक,

भारत के जिलेवार/राज्य वन क्षेत्र (क्षेत्र वर्ग कि० मी० में)

क्रमांक	जिला/राज्य	भौगोलिक क्षेत्र	वनावरण		योग	भौगोलिक क्षेत्र में वनावरण का प्रतिशत
			घनावन	खुलावन		
1.	हैदराबाद	217	—	—	—	—
2.	डिब्रूगढ़	7170	1095	155	1250	17.43
3.	रांची	18266	2096	2421	4517	24.73
4.	गोवा	3702	995	249	1244	33.66
5.	अहमदाबाद	8707	8	46	54	0.62
6.	गुड़गाँव	2716	13	18	31	1.14
7.	शिमला	5132	2094	331	2425	47.25
8.	अनंतनाग	7201	1476	716	2192	30.44
9.	बैंगलूर	8005	167	509	676	8.44
10.	त्रिवेन्द्रम	2192	317	77	394	17.97
11.	भोपाल	2772	41	191	233	8.41
12.	बम्बई नगर	157	—	2	2	1.27
13.	कोहिमा	4041	1471	1844	3315	82.03
14.	कटक	11142	506	532	1078	9.50
15.	अमृतसर	5087	—	9	9	0.18
16.	जयपुर	14068	37	367	404	2.87
17.	चेन्नई	170	—	5	5	2.94
18.	लखनऊ	2528	7	22	29	1.15
19.	जलपाईगुड़ी	6227	1414	164	1578	25.34
20.	चंडीगढ़	114	6	1	7	6.14
21.	दिल्ली	1483	16	10	26	1.75

स्त्रोत — वन स्थिति रिपोर्ट — 1995

नोट — बम्बई नगर में 1 वर्ग कि० मी० वायुशिप वन भी सम्मिलित हैं।

गले सम्बन्धी रोग, सिरदर्द, हृदय और फेफड़े सम्बन्धी रोग होते हैं और साथ ही त्वचा भी खराब होती है। वायु प्रदूषण से गर्भवती महिलाओं पर प्रतिकूल असर पड़ता है। गर्भपात की संख्या बढ़ती है और ऐसे वातावरण में जो बच्चे पैदा होते हैं वो भी शारीरिक और मानसिक दृष्टि से पूर्ण स्वस्थ नहीं होते। वाहनों में उपयोग होने वाले ईंधन से भूमण्डलीय तापमान में वृद्धि हो रही है। इससे ओजोन परत क्षीण हो रही है और अम्लीय वर्षा जैसी समस्याओं का सामना करना पड़ रहा है।

जल प्रदूषण— आज भारत में शुद्ध जल सिर्फ बीस प्रतिशत लोगों को ही उपलब्ध है। देश की सभी नदियाँ, झील, तालाब अपने वहन क्षमता से ज्यादा मल-जल ढो रही हैं। इस प्रदूषण में शहरों का अधिक योगदान है। गंगा नदी की बड़हाली कानपुर, बनारस, पटना और कलकत्ता में देखी जा सकती है। यही हाल यमुना का दिल्ली, मथुरा और आगरा में है। झीलों पर नजर डालें तो चिल्लाका (उड़ीसा), लोकटेक (मणीपुर) डल और वूलर (कश्मीर) अत्यधिक संकट के दौर से गुजर रही हैं।

उपरोक्त प्रदूषणों का निदान काफी हद तक वनस्पति पेड़ पौधे आदि से किया जा सकता है।

शहरी वानिकी से लाभ :— शहरी-वानिकी से अनेकानेक लाभ है। स्वच्छ वातावरण से लेकर छाया, सौंदर्य और ऐसे ही अनेक अनगिनत लाभ हैं, जिसे हम प्रत्यक्ष रूप से दृष्टिगोचर नहीं कर पाते हैं।

वातावरण में सुधार :— हमारा वातावरण मुख्यतः ताप, वायुमयी, वायुवेग आदि से निर्धारित होता है। हम अपने आधुनिक घरों का वातावरण अपने कृत्रिम निर्मित चीजों/उपकरणों द्वारा अपनी जरूरत के अनुसार नियंत्रित करते रहते हैं परन्तु प्रकृति में ये चीजे पेड़, पौधों एवं झाड़ियों आदि से ही नियंत्रित होता है।

तापक्रम :— मानव शरीर के लिए आरामदायक तापक्रम 98.6°F (37°C) हैं। परन्तु शहरों में सदा यही तापक्रम रहे, ऐसा सम्भव नहीं है। शहरों में ईंट, पत्थर, लोहा, इस्पात शीशा, बड़े-बड़े विज्ञापन बोर्डों की भरमार होती है। गांवों की अपेक्षा शहरों का तापमान सदैव 0.5 ये 1.5° डिग्री सेंटीग्रेड ज्यादा रहता है। सर्दियों में यह अन्तर सुखद रहता है परन्तु गर्मियों में यह अन्तर बैचेनी पैदा करता है। शहरी-वानिकी के अन्तर्गत पेड़-पौधे लगाकर इस समस्या को हल किया जा सकता है क्योंकि पेड़-पौधे वाष्पीकरण द्वारा ठंडक पहुँचाते हैं और प्रकृति के लिए ये वातानुकूलन का काम करते हैं। ऐसा अनुमान है कि एक अकेला बड़ा पेड़ अगर मृदा-नमी अच्छी हो तो 400 लीटर पानी प्रतिदिन वाष्पित करता है (क्रैमर और कोजलोस्की 1970), जो औसतन पाँच वातानुकूलन मशीनों के बराबर है जिनकी शक्ति दिन में 20 घंटे चलते रहने पर 2500 कि०लो० प्रति घंटे है (फीडर 1970)। जहाँ पेड़ होते हैं वहाँ दिन रात के तापमान में भी अन्तर धीरे-धीरे आता है।

वायुवेग :— वायुवेग का भी हमारे दैनिक जीवन में बहुत महत्व है। वायुवेग प्रत्यक्ष रूप से तापमान और वायुमयी को प्रभावित करता है। पेड़ों की उपस्थिति वायुवेग को नियंत्रित करती है। और अपने चारों तरफ एक आश्रयपट्टी और वात-रोधक का निर्माण करती है। सर्दियों के मौसम में घरों के पास पेड़ों के होने से तापमान भी रात में धीरे-धीरे कम और दिन में धीरे-धीरे बढ़ता है। इस तरह के एक अध्ययन से पता चलता है कि इससे घरों में उपयोग होने वाले ईंधन की 23 प्रतिशत बचत की जा सकती है (रोबिन्टन 1972)। भवनों के आस-पास वात-रोधक और आश्रय-पट्टी का निर्माण करते

समय पेड़ों की प्रजातियों का मुख्य रूप से ध्यान रखना चाहिए। घने छत्र वाले पेड़ों को उत्तर और पश्चिम दिशा में लगाना चाहिए, ताकि जाड़ों में सर्द हवा से बचा जा सके। पतझड़ी वृक्षों को दक्षिण और पूर्व में लगाना चाहिए, ताकि गर्मियों में गर्म हवा से बचा जा सके और सर्दियों में धूप आ सके। शहरों में सड़कों के किनारे भी वृक्षों की उपस्थिति पथिकों को आराम और छाया पहुँचाती है परन्तु साथ ही इनके रख-रखाव की उचित व्यवस्था होनी चाहिए अन्यथा अनचाही घटनाएं घट सकती हैं।

ध्वनि प्रदूषण :— ध्वनि प्रदूषण आजकल शहरों के आवश्यक अंग बन गए हैं। पेड़ अपने पत्तों, शाखाओं, छाल द्वारा ध्वनि तरंगों को या तो अपने अन्दर कुछ हद तक अवशोषित कर लेते हैं या कुछ भाग को परावर्तित कर देते हैं, इस तरह ध्वनि सीधे हमारे सम्पर्क में नहीं आती हैं और उससे होने वाले दुष्प्रभावों से हम बचे रहते हैं। ऐसा अनुमान है कि 1000 सी०पी०सी० आवृत्ति वाले ध्वनि तरंगों को पेड़ 7 डेसीबल प्रति तीस मीटर की दूरी से कम करने में सक्षम है।

यातायात से होने वाले ध्वनि प्रदूषण को अगर सड़कों के निर्माण के समय ही पेड़ों को भी उचित स्थान दिया जाए तो इस समस्या को बहुत हद तक काबू में लाया जा सकता है।

वायु प्रदूषण :— वायु-प्रदूषण को पेड़ किस हद तक नियंत्रित करते हैं, यह एक शोध का विषय है और इस क्षेत्र में और शोध होने चाहिए। परन्तु यह सत्य है कि पेड़ों से हमें जीवनदायनी आक्सीजन गैस मिलती है। यह भी सत्य है कि इस भूमण्डल का 88 प्रतिशत आक्सीजन समुद्र के जलीय वनस्पति के प्रकाश सश्लेषण द्वारा मिलता है। ऐसे ही कुछ वृक्ष हैं, जो विशेष प्रकार के वायु प्रदूषकों को अवशोषित करने में सक्षम हैं जैसे हाइड्रोजन फ्लोराइड, सल्फर आइआक्साइड और नाइट्रोजन डाइआक्साइड। जो प्रदूषक गैस सबसे कम अवशोषित होती है वह है कार्बन मोनोआक्साइड और ग्रीन हाउस गैस सबसे ज्यादा वायु प्रदूषण में सहायक है। पेड़ों की उपस्थिति शहरों में धूल धुएँ जैसी चीजों को रोकने में सक्षम है और इनके रहने से वातावरण में स्वच्छता का संचार होता रहता है। आजकल शहरों में शीशे का भरपूर उपयोग हो रहा है, इससे परावर्तित रोशनी आँखों में चुभन पैदा करती है, साथ ही वातावरण के तापमान को बढ़ाती है। जहाँ भवनों के निर्माण में शीशों का उपयोग होता है वहाँ उचित दूरी पर उचित पेड़ों को भी लगाना चाहिए ताकि चकाचौंध की समस्या न उत्पन्न हो।

सौंदर्यकरण :— शोभादार पेड़ों को पंक्तिबद्ध तरीके से भवनों के पास लगाने से उनकी शोभा और बढ़ जाती है। यह दृश्य आँखों को शीतलता और सुख प्रदान करती है। शहरों में फ़ैक्टरियों, पार्कों और वन अड्डों के आस-पास भी वृक्षों को लगाने से शहरों की तस्वीर अच्छी बनायी जा सकती है।

छोटा चिड़ियाघर :— पशु-पक्षी हमारे वातावरण और पर्यावरण के अभिन्न अंग हैं। उनको देखने और उनके बारे में जानकारी लेने के लिए चिड़ियाघर से बेहतर स्थान भला क्या हो सकता है। चिड़ियाघर अपने आप में एक संस्थान होता है जहाँ आम आदमी को वन्य, पशु-पक्षियों को निकट से देखने का मौका मिलता है वहीं चिड़ियाघर के प्रबन्ध को उन पशु-पक्षियों के बारे में शोध का पूरा मौका मिलता है। चिड़ियाघर आम-आदमी खासकर स्कूली बच्चों में वन पशु-पक्षियों के बारे में अभिरुचि और लगाव पैदा करता है। अतएव प्रत्येक शहर में एक छोटा चिड़ियाघर होना आवश्यक है। उनका प्रबन्धन सरकारी संख्या के बजाय स्वयंसेवी संस्थाओं के पास होना चाहिए। उनमें से प्रत्येक जीव-जन्तुओं को अगर निजी कम्पनियों द्वारा उनकी देख-रेख का जिम्मा

के लिया जाए तो बहुत ही अच्छी बात हो। बदले में इन निजी कम्पनियों द्वारा इन जीव-जन्तुओं की देख-रेख में जितना खर्च आता है, उसे सरकार द्वारा उन्हें उतनी ही रकम की आयकर छूट दे दें तो इससे निजी कम्पनियों को इस क्षेत्र में आगे आने में प्रोत्साहन मिलेगा।

शहरी-वानिकी के प्रोत्साहन हेतु निम्नलिखित सुझाव दिये जाते हैं :—

शहरों में पेड़ों को लगवाने के लिए 'ट्री इन्स्पेक्टरों' की नियुक्ति की जाए।

'ट्री इन्स्पेक्टर' के ऊपर वाले पद पर 'ट्री वार्डन' की नियुक्ति की जाये।

ये दोनों पद ही शहर के परम्परागत वन-विभाग के अधीन हों।

'ट्री इन्स्पेक्टर' के लिए वानिकी स्नातक और 'ट्री वार्डन' के लिए वानिकी स्नातोक्तर की सेवाएं ली जाए, इससे उन्हें उचित काम भी मिलेगा और उनके लिए रोजगार के अवसर भी उपलब्ध होंगे।

राष्ट्रीय स्तर पर मित्र-भिन्न शहरों के लिए उपयुक्त पेड़ों का शोध व चुनाव हेतु कार्यक्रम तैयार किया जाना चाहिये।

News

Forest Owls are back from oblivion*

By Paul Recer

AN INDIAN "mystery bird" unseen for 113 years and suspected to be extinct has been photographed by American scientists who had uncovered a bird-watcher's scandal.

Pamela Rasmussen of the National Museum of Natural History in Washington and two colleagues *sighted the Indian Forest Owlett in a wooded area near Shahada, India, north-east of Bombay.*

"The last definite report on this bird was when a specimen was collected in 1884," Rasmussen said.

"I didn't really expect to find it.....This is a once-in-a-lifetime thing."

The Forest Owlet, or Blewitt's Owl, grows to about 20 centimetres with big eyes and outsized beak, feet and talons. It is brown with distinctive bands on its wings and underside and is one of the puzzles of the bird world.

"It is considered one of the mystery birds of India," Rasmussen said.

She said the first recorded sighting of the owl was in the 1870s and over the next 12 years there were seven specimens collected and stuffed.

After that, no positive sightings had been recorded for 113 years.

"There were four reports this century, but we found that each of these reports was erroneous or unconfirmed," Rasmussen said.

One of the reports was downright phony, the Americans found.

British bird collector Richard Meinertzhagen claimed to have collected and stuffed a specimen in 1914. But after close analysis of the specimen, Rasmussen concluded Meinertzhagen had made a false claim.

"He claimed to have collected it in one locality in 1914 when, in fact, it had been stolen from the British museum," she said

The specimen was restuffed and archived with the false claims by Meinertzhagen.

*Canberra Times ("More to Life" supplement), 6 Jan '98.

A close study, however, showed the bird was actually collected in the 1880s by a bird scientist who used a unique method of preserving specimens. Rasmussen said the claim by Meinertzhagen, who died in the 1960s, was clearly a fraud.

Intrigued by the owlet, Rasmussen, Asian-bird expert Ben King of the American Museum of Natural History in New York, and Virginia bird watcher David Abbott went to India to look for the elusive bird.

After days of failure at one location, they spotted two of the small owls in the forests near Shahada. Rasmussen said the birds, observed on two different days in November, might be a breeding pair.

If they were of the same gender they would not tolerate each other in the same hunting area, she said.

One bird was seen with blood on its sharply curved beak, indicating it had recently fed on a mammal or bird it had to tear apart. The scientists said this suggested the small owlet fed on prey not much smaller than itself—but that was just a guess.

Rasmussen said so little was known about the owlet that it had been considered one of the three "mystery birds" of India.

"There are two remaining mystery birds of India," she said. "The pink-headed duck (last recorded in the 1930s) and the Himalayan Mountain quail (last recorded about 100 years ago).

"There is no definite evidence that they survive".

The Forest Owlet, too, was considered possibly gone forever, but it was known now that it had survived, she said.

—Associated Press

A sea of troubles

Times of India, March 1, 1998

The Gahirmatha beach, early this year, was dotted with turtle carcasses. The fishing trawlers at the famous Gahirmatha rookery, off the Orissa coast, left 4,000 Olive Ridley turtles dead at the onset of the arribada, the mass mating season.

The Olive Ridley turtle, *Lepidochelys olivacea*, is an endangered species of sea turtles. Over half a million female Olive Ridley turtles arrive annually at Gahirmatha to lay over 50,000,000 eggs in late December and January and then again in March and April. It is estimated (assuming that the male and female ratio is 1 : 1 and the males accompany the females to the sea), over one million turtles visit the Orissa coastal waters annually.

However, for the past few years, the sea creatures have become easy victims of incidental catch by large trawlers that fish for prawns in the sea here. The trawlers use long line nets and the turtles invariably get caught in the hooks of the plastic gill nets. They are either fatally hit by the propellers or if they are hauled up alive, are hacked and thrown back into the sea. Every year over 2,000 turtles are thus wantonly killed.

In the United States, it is mandatory for fishing trawlers to use Turtle Excluder Devices (TEDs), a simple device that allows the turtles to escape unharmed. However, in India the fishermen are not even aware of it and the government despite their plans to spread awareness about TEDs have not yet introduced the concept to the local fishermen.

Although the fact of mass nesting is well-known, the phenomenon has so far been poorly understood by scientists. Most authors credit mass nesting behaviour with a survival value, seeing it as a strategy to swamp the predators with a temporary over-abundance of food, a sudden deluge of potential prey, adult turtles, their eggs and two months later the hatchlings. Although the predators may consume all they can, the phenomenon is over so soon that many of the turtles still survive and, in fact, excessive predator population levels are inhibited as they cannot be sustained simply on one or two big meals a year.

Environmentalists worldwide have been demanding that the Bhitarkanika Wildlife Sanctuary and the Gahirmatha coast within it, and a 20 km area of the sea should be declared a marine sanctuary and a national park. In fact, Todd Steiner of the Earth Island Institute, USA, has demanded that Bhitarkanika should be recommended as an International Biosphere Reserve and a World Heritage Site under provisions set forth by the United Nations in a letter to the Prime Minister of India in 1993.

The three other well-known sites for mass nesting, two in Mexico and one in Costa Rica off the Pacific coast, have been laid waste in the recent past with large-scale fishing by mechanised trawlers. It is, therefore, crucial that the scientific community the world over get its act together if the last surviving nesting ground of these gentle sea species is to be saved from destruction.

Farmers 'encouraging' poaching of black bucks

Law Kumar Mishra

The Times of India, New Delhi, June 22, 1998

BHOPAL: Over 2,500 black bucks have been killed in the Karera national park in Shivpuri district in the last two years. Forest department officials have admitted that hunters were killing the wildlife as the foresters did not get co-operation from the farmers. The population of the Great Indian bustard in the sanctuary has also come down from 40 in 1987 to zero now.

According to official sources, the population of black bucks in the sanctuary has come down from 3,777 to about 1,600 due to poaching. The farmers were encouraging killing of black bucks as their farms were being damaged by the wildlife. The sanctuary was created as a habitat for the Great Indian Bustards, but none of the bustards could be saved. According to a forest official, "Destruction of the bustard habitat by way of expansion of agriculture is one of the major threats to the bustards of the sanctuary. The land inside the sanctuary is either privately owned or revenue land and is not under the control of the forest department."

L.R. Burdak, conservator of forests, Shivpuri, told The Times of India News Service over phone that since the villagers were not extending their co-operation to the forest guards, it was difficult to prevent poaching of the wildlife. He said there were 1,600 black bucks left in the park against 3,777 in 1993. He said groups of poachers might be active, but no case had been filed as none was caught poaching. However, non-governmental organisations, active in wildlife preservation, disputed the claim of the conservator and claimed that only 200 black bucks were left in the park.

The villagers, who are apprehending their displacement due to the expansion of the national park, have apparently started a campaign to liquidate the population of black bucks to prevent the authorities from acquiring their farms under the national park jurisdiction. They invited poachers from Jhansi and Gwalior to kill black bucks.

The Karera sanctuary, situated in Narwar and Karera tehsils of Shivpuri district, was notified on May 21, 1981 for the protection of the Great Indian Bustard.

1 held for smuggling animal skins

Staff Reporter

Times of India, 22-6-98

NEW DELHI: North district police have arrested an alleged poacher, Raj Kumar alias Pappu who has been involved in smuggling animal skins and bones. Raj Kumar is reportedly the brother of alleged wildlife poacher Sansar Chand.

The district police had information that Raj Kumar would be visiting his house in Sadar Bazar area on Friday to meet his elder brother Sansar Chand. A trap was laid at house No. 1166 and he was caught by the police team around 6 p.m.

"He is a very clever operator and has been arrested in only a few cases earlier. But, organisations like Wildlife Protection Society of India are also of the view that Raj Kumar is actively involved in this trade," a district police official said.

Raj Kumar used to purchase animal skins and bones from other poachers as well as throwaway prices and then send them to Sansar Chand, who used to sell them in

the international market at much higher prices, the police said. Sansar Chand has, so far, been arrested nine times in Delhi and some other cities—he has never been convicted. "Huge quantities of animal skins and bones have been recovered from him on each occasion," an official said.

Raj Kumar has reportedly been in the trade for more than a decade. "Sansar Chand had introduced Raj Kumar to this trade," a police official said.

The earliest recorded case in which Raj Kumar has been named as an accused dates back to December 1988, in the Sariska tiger reserve where Raj Kumar and his associates reportedly shot dead a tiger.

Investigations in another case led to the recovery of a leopard skin and bones from Raj Kumar's possession. The police had arrested 15 persons in this case, including Raj Kumar. He was declared a proclaimed offender in this case by the chief judicial magistrate, Alwar, in 1989.

Raj Kumar had earlier been arrested by the police in May 1993, with his brother-in-law Kishanlal and six leopard skins were seized from him. He was also alleged to be involved in smuggling Mandrax tablets. One such consignment was seized at the Indira Gandhi international airport. The police suspect Raj Kumar has been involved in poaching in the Dudhwa National Park and the Jim Corbett tiger reserve.

From our readers

Dear Sir,

I enjoyed every page of Cheetal's "Tiger and Panther" issue. Congratulations on the excellent work of the Society.

Yours sincerely,

Dr. Ranjit Bhargava DFAPh.D
Order of Merit (Germany)
The Hive, Ayarpata,
Naini Tal 263 001
June 4, 1998.

Sir,

Recently I have seen your journal 'Cheetal' through an active forest officer who was travelling in the same bus. I got some time to read the journal. Of course it is an excellent, fantastic, full fledged magazine focusing on wildlife conservation and nature.

Yours faithfully,
Ishtiyag Ahmad Zavgar
C/o F.R. Traders
Anantnag-192101 (J&K)
Court Road, Dangarpura

Dear Mr. Negi,

I have been closely following the financial crises the Society is passing through with natural concern. I know what it is running an organisation and in particular a wildlife society. Added to it is the journal which drains the little resources.

I am enclosing a cheque for Rs. 2115/- to be adjusted as follows :—

Rs. 600/- towards life membership.
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Perhaps you know that I am a well known wildlife photographer in the country. If you need pictures for any fund raising projects do not hesitate to write. I will only be too happy to contribute.

I wish the Society all the best.

Regards.

Yours sincerely,
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Mission Road,
Post Box No. 2766
Bangalore—560 027

Thank you, Mr. Rao, for the benevolent offer. We will approach you soon in this connection. Below are the publicity comments on your good work.

I.S. Negi

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1. The aims and objects of the Society are as follows :-

- (a) To promote interest and impart knowledge regarding the preservation and conservation of all forms of wildlife, particularly among the youth of the country.
- (b) To cooperate with the Govt. of India and State Governments and with others Societies and Institutions having similar aims and objects in working for the interests of wildlife.
- (c) To assist in enforcing and actively supporting the Forests Acts, Wild Birds and animals Protections Acts and Rules etc. of State Governments and the Indian Arms Act and Rules in so far as they pertain to wildlife and to bring to the notice of the authorities any infringement of the same and to assist in the detention and prosecution of offenders in respect of such laws.
- (d) To advise and help the Govt. and wildlife administrators in the formation, maintenance and protection of Sanctuaries and National Parks, preservation of wildlife in general and endangered species of india in particular and in the introduction of exotic species into the country, rehabilitation of endangered species etc. and in the formulation and amendments of rules and acts, so as to conserve and increase wildlife stocks.
- (e) To raise funds for carrying out the above aims and objects and to found and maintain museums, reading rooms and libraries of natural history in order to disseminate knowledge regarding wildlife.
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